External Review of

DEPARTMENT OF CIVIL AND EARTH RESOURCES ENGINEERING

KYOTO UNIVERSITY

March 2004

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at Room 315, No. 5 Building of Faculty of Engineering

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Part 1

External Review of the Department

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External Review of
Department of Civil and Earth Resources Engineering
of the Graduate School of Engineering at Kyoto University

by

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Synopsis

On March 8, 9 and 10, Professor Daniel P. Abrams visited the campuses of Kyoto University to provide an external review of the Department of Civil and Earth Resources Engineering. In addition, on March 12, he met in a summary exit interview with departmental faculty which included members of the Department Assessment Committee. This external assessment was requested by Mitsuhiko Araki, Dean of the Faculty of Engineering and Graduate School of Engineering at Kyoto University. The scope of the review included research activities, graduate education and international activities. This report summarizes this review, and provides general observations and recommendations by the external assessor that are intended to improve the quality of the department in the future.

1. Summary of Assessment Activities

A Departmental Assessment Committee consisting of E. Watanbe (chair), M. Matsumoto, T. Asakura, T. Miyagawa, and F. Oka (ex-officio) organized the review and met with the external assessor. Associate Professor T. Utsunomiya assisted the Assessment Committee with logistics.

This review was timely because of the re-organization of the department in April of 2003 and the new shift in status from that of a national university to an independent university in April of 2004. Results of this review are intended to be used for future reference when planning new programs and departmental directions.

The objective of this assessment exercise was for the department and the college to develop a clearer understanding of its current status with respect to education and research with an emphasis on innovative development in the future. Because the department is just over one year old, this review was felt to be pivotal in terms of setting future directions. This assessment was made by a reviewer familiar with academic systems in the United States and thus the perspective of this report is not necessarily within the context of a Japanese academic system but rather relative to international academic institutions external to that of Japan. This was done intentionally to provide comments based on how the department can advance internationally.

The external assessor met with faculty and staff in the various laboratories of the department including: structural mechanics (Professor E. Watanabe), bridge engineering (Professor M. Matsumoto), structural materials engineering (Professor T. Miyagawa), applied mechanics (Professor T. Tamura), environmental hydrodynamics (Professor I. Nezu), geomechanics (Professor F. Oka), geophysics (Professor Y. Ashida), engineering geology (Professor T. Matsuoka), geo-development engineering (Professor T. Saito), geo-mechatronics (Professor K. Hanasaki), erosion and sediment runoff control engineering (Professor K. Inoue), hydroscience and hydraulic engineering (Professor H. Nakagawa), geotechnics for hazard mitigation (Professor S. Iai), waterfront and marine geohazards (Professor H. Sekiguchi), and computational mechanics (Professor N. Nishimura). During visits to

each laboratory, presentations were made by the respective professor, associate professor and research associate. The assessor visited laboratories on the main Kyoto campus, the new Katsura campus, and the Disaster Prevention Research Institute including the Uji River Hydraulic Experimental Station.

2. Research Activities

The department is highly active in research and has great depth in the needed civil and earth resources engineering technologies. It has a long-standing distinguished reputation as one of the best civil engineering programs in Japan, and as a result, attracts some of the best students to its research programs. The department continues today its traditional role in civil and earth resources engineering as a national university in Japan. However, with recent changes (effective April 1, 2004) Kyoto University will no longer have status as an official national university and will be forced to adapt to the new wave of policies set forth by the Japanese national government.

The faculty in civil engineering and earth sciences at Kyoto University are highly regarded within and outside of Japan. Their research output is prolific and is of high quality. In general, laboratory teams work well together with senior faculty being supported by junior faculty, other academic staff, graduate students and undergraduate students. The department is well staffed with a good balance of senior and junior faculty as a result of its division into individual laboratories.

The department was characterized by one faculty member as a “frog in a well,” meaning that it must strive to be more competitive, particularly in light of the recent shift from its status as a national university. This will no doubt affect less popular research areas that do not have the potential for attracting external research funding in the future. Departmental laboratories will need to be more aggressive in competing for national research funds necessary for their sustainability as the new shift takes place. The department should develop a strategic plan for responding to this new circumstance. At the very least, funding plans for operation and maintenance of experimental facilities need to be developed. But more importantly, plans should be developed to ensure that the department can retain its high-level research stature in the absence of direct government support as enjoyed previously as a national university.

The fifteen laboratories of the department cover many of the pertinent research areas of civil and earth resources engineering and produce highly recognized research. However, the department does not seem to have a central research theme or emphasis, or a strategic research plan. The segregation of the department research interests into individual laboratories does not promote inter-laboratory research, none-the-less interdisciplinary or diverse research. Though change to overcome traditional department organization is indeed difficult, without it, the department may lag behind more aggressive academic institutions that pattern their research organization about more modern concepts.

The predominance of departmental faculty received both their undergraduate and graduate degrees from Kyoto University. This in-breeding of faculty from generation to generation constrains the intellectual breadth of the department. Diversity in academic backgrounds is essential to blending of creative thoughts. Without it, change in research perspectives, needed for future development and competitiveness will be difficult to achieve. Moreover, as faculty backgrounds become more varied, the research perspectives of the faculty will become more internationally focused. Like the frog coming out of the well, they will see new horizons beyond Kyoto.

Because much intellectual strength resides within the creativity of younger researchers, junior faculty should be encouraged to assume more authority and responsibility in research rather than simply assisting senior faculty. Younger researchers in other countries are permitted to exercise such academic freedom and as a result, make more rapid research advancements. As well, when junior

faculty become older and assume positions as senior faculty, they will be more effective as a result of having a wider exposure to research in their earlier years.

The department has demonstrated in the past that it can attract high quality post-doctoral researchers from Japan and well as internationally. Unfortunately, funding is often not available to support them. It is recommended that special budgets be assigned specifically to the support of post-doctoral researchers since this is an effective way to develop proposals for new research and to execute present research.

The experimental research facilities within the department are extensive and have served their purpose for many years, though without adequate upkeep or maintenance. Now, many of these facilities on the main campus are old and deteriorated, and present a threat to the quality of current research or to the attraction of future research funding. However new facilities at the Katsura campus are outstanding as are the Uji River Hydraulic Experimental Station of the DPRI. These new research facilities have an outstanding potential to place Kyoto University back in the lead with respect to civil and earth resources research within Japan as well as internationally.

The computational facilities at Kyoto University are excellent, particularly the new equipment for supercomputing which are the largest at any academic institution in Japan if not the world.

3. Graduate Education

The department provides excellent education opportunities for graduate students and deserves its top rating as one of Japan's premiere academic institutions. The department offers masters and doctoral degrees that are highly respected by industry and academia within and outside of Japan.

Education through teaching is highly valued by departmental faculty. Though active in research, full and associate professors stress the importance of teaching.

Some faculty members partake in self-assessment of their teaching through ad-hoc student evaluations which they administrate. Next year, department-wide student evaluations of instruction will commence. This is seen to be a very positive step towards improvement of teaching and the classroom experience for students.

The graduate curriculum of courses is similar to that offered at leading universities internationally. Requirements for the MS degree are more difficult than those in the United States with up to 13 courses in addition to a thesis which is mandatory. Since courses meet over a shorter time than American courses, a direct equivalence cannot be made, but a course load of seven courses in one semester presents a more demanding curriculum on master's students than at top graduate schools in civil engineering in the United States.

PhD students are required to take a minimum of three courses but are recommended to take more. Doctoral students must pass an entrance exam as well as a written and oral presentation of their research proposals. This is similar to requirements at most graduate schools in the United States and other countries. Final thesis defenses must be approved by the full faculty of the college of engineering. This is a unique requirement of which the reasons seem uncertain to this assessor and appears to present undo stress to a faculty advisor and expend great deals of time of otherwise un-interested faculty not versed in the technicalities of a particular doctoral dissertation. Some thought should be given to alleviating the requirement for full college approval of doctoral theses so that faculty time can be freed for more productive endeavors.

Course instructors are allocated from full and associate professors in the department's laboratories. Thus, educational material is closely related to the research done in respective units of the department.

Facilities for conventional classroom lectures are sufficient in terms of audio/visual and computational equipment. However, facilities for distance learning (e.g. satellite facilities) lag behind available technologies. Courses offering laboratory experiences for students are in need of more modern and advanced laboratory equipment.

Opportunities exist in the near future for classes to be offered at Kyoto University in partnership with similar courses offered at other universities in the world. One example of this, a joint course between UCLA and Kyoto in computational methods, is presently underway that can serve as the model for new multi-lateral, inter-institutional courses in the future. Universities in the United States would find such collaborative courses with Kyoto University as an attractive way to promote internationalism to their domestic students and should thus be motivated to work with Kyoto University.

4. International Activities

International activities of the department are largely a result of collaboration within the individual laboratories, some of which are highly active internationally and others are not. Several agreements are in place between the department and foreign departments with respect to education and research. It is strongly recommended that the department encourage and promote each individual laboratory to engage in international cooperative research activities.

Kyoto University has an excellent affinity to attract international researchers from all over the world. The university should exploit this strength further by providing dormitories for international visitors that are convenient to their campus offices. Because of space limitations on the main campus, new construction of dormitories may not be possible, but it is highly recommended for the new Katsura campus.

5. Departmental Management

The department is a large operating body of nearly fifty faculty and academic staff members in addition to support staff. Faculty members conduct research and teach within fifteen separate and independent laboratories at four locations in the Kyoto area.

Management concepts for this operation are based largely on delegation to the principal faculty member in charge of each laboratory who in turn delegates research and teaching responsibilities to his respective associate professors and research associates as well as administrative and secretarial responsibilities and tasks to his respective staff member. This chair type system is characteristic of that found in traditional academic institutions in other parts of the world, particularly Europe. Whereas this type of system is highly organized, it is not necessarily the best for cultivation of new ideas and for setting of new directions because the fixed management structure inhibits cross-laboratory or cross-disciplinary research collaboration. The department cannot easily transform itself to adopt new emerging technologies if existing laboratories must be maintained until a professor retires. Moreover, creative ideas of younger faculty often are not exploited since they are not necessarily serving as independent academic members of the faculty. Transformation of this basic management structure is indeed difficult because the decision makers are the same senior faculty who presently lead each laboratory and appreciate the assistance and support of those staff members in their respective units.

The size of the faculty may be perhaps too large to administrate by a single department head. Associate heads responsible for education or research would help to alleviate this management burden. As well, the one-year rotating term of department head may not be effective for continuity and for a head to strive towards meeting his long-term vision of where the department should go. Instead, a dedicated position as department head, rather than rotating position, would enhance future development of the department as well as ensure continuity.

6. Recommended Actions

Based on the observations stated previously, the department is encouraged to take action on the following recommendations.

1. The department should develop a strategic research plan incorporating a central theme and desired emphasis towards specific areas of excellence. This plan should be responsive to the recent shift in stature of Kyoto University from a national institution to an independent one.
2. The department should enhance the diversity of its faculty with respect to their academic backgrounds. New faculty should be hired from graduate programs other than Kyoto University.
3. Junior faculty should be encouraged to assume more authority, autonomy and responsibility to conduct their own research.
4. Funding should be sought at the departmental level to support post-doctoral researchers from Japan and other countries.
5. Departmental-wide student evaluations of classroom teaching should be implemented and used to assess faculty teaching performance.
6. Requirements for approval of PhD theses by the full college faculty should be relaxed so that faculty can spend their time more effectively.
7. Laboratory experiences for students should be promoted with the acquisition of modern experimental equipment for instruction.
8. New inter-institutional courses with universities abroad should be pursued to broaden student's perspectives and to increase the visibility of Kyoto University internationally.
9. The department should encourage and promote each laboratory to be engaged further in international cooperative research activities.
10. The department should examine the feasibilities of changing from the traditional chair system to one with less academic boundaries that has the potential to foster cross-disciplinary research in new, emerging research thrust areas.
11. The term of department head should be lengthened beyond one year. As well, a long-term dedicated leader, rather than a rotating head, may be necessary to implement needed improvements.
12. Additional external assessments should be done at two-year intervals to evaluate the impact of improvements to the department and recommend further actions.

Part 2

Summary on Education, Research, and International Activities of the Department

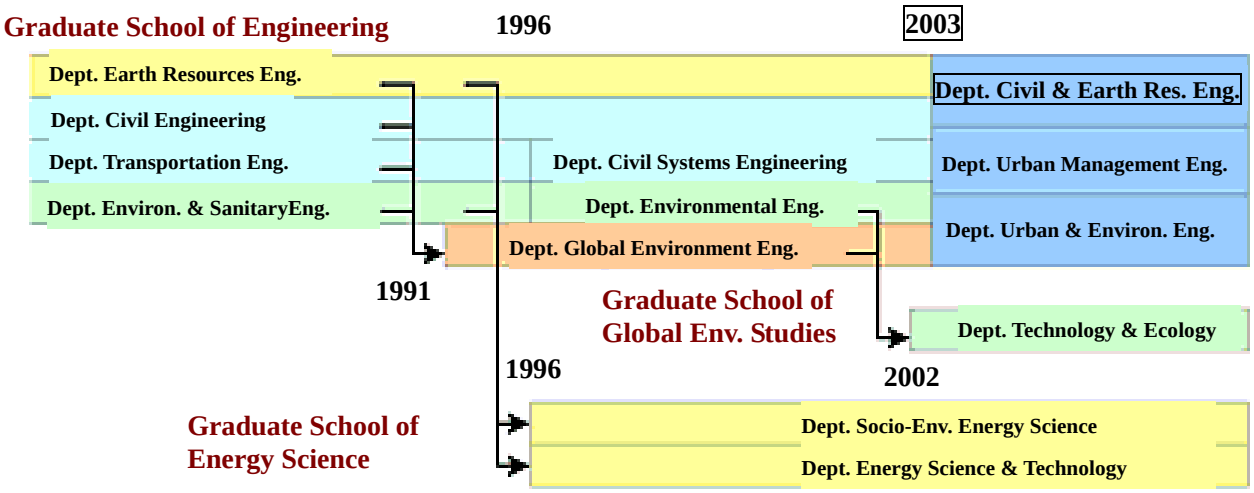
The Outline of the Major

The last century has brought about various rapid scientific developments. However, it was not without negative legacy such as environmental problems, etc. It is now considered necessary to introduce new scientific technologies based on a new paradigm in order to solve problems of the 20th-century-type society from the technological points of view, and to construct fundamental infrastructures for safe and sustainable societies on the earth.

Specifically, how should one plan, design, construct and maintain important infrastructures in a safe and economical manner in a sustainable civilized society? Also, what kind of technologies for exploration, production and geological information evaluation will be needed in order to utilize the natural resources, energy, and the underground spaces effectively?

The Department of Civil and Earth Resources Engineering endeavors to solve these problems from the standpoint of Engineering Science. Namely, we aim at technological innovations for the construction of fundamental infrastructures, effective use of natural resources and energy and the creation of safe, sustainable societies on the earth, taking the ecumene, the structures thereof and the resources deposited underground as the research subjects.

Organization of Department of Civil and Earth Resources Engineering



The Department of Civil and Earth Resources Engineering was established in 2003 reorganizing former departments of Civil Engineering, engineering science related parts of Global Environment Engineering and Earth Resources Engineering. It consists of 7 divisions and 15 laboratories including cooperating laboratories from the Disaster Prevention Research Institute and Academic Center for Computing and Media Studies.

The Department of Civil and Earth Resources Engineering, together with Departments of Urban Management Engineering and Urban and Environmental Engineering, form the so called Global Engineering Departments, and are closely related to the Undergraduate School of Global Engineering.

The Aims of Department of Civil and Earth Resources Engineering

The aims of our department are summarized into the following three:

1) Solution of problems related to infrastructures and earth resources using the state of the art technologies based on Engineering Science.
2) Development of safe, secure and pleasant infrastructures.
3) Achievement of sustainable use of the natural resources.

Education Policy of Department of Civil and Earth Resources Engineering

The Department of Civil and Earth Resources Engineering creates and develops new analysis and design technologies for the development and maintenance of the infrastructures, disaster prevention, and the exploration, development and use of the natural resources and energy. We do these through the integration and development of the traditional fundamental technologies for infrastructures and new technologies in the framework of computational, experimental theoretical and applied mechanics. We thus offer students chances to learn and to do researches on technologies which contribute to the sustainable development of mankind, its harmony with the environment and stable supply of natural resources.

Prescribed Number of Graduate Students

Prescribed numbers of graduate students for the Global Engineering Departments are as shown in the following table:

Department	Master's Course/Yr	Doctor's Course/Yr
Civil & Earth Resources Engineering	41	14
Urban Management Engineering	44	15
Urban & Environmental Engineering	98	35

Curriculum at Department of Civil and Earth Resources Engineering

Subjects for Master's program

	Subject	Teachers	Hours per week		credits
			1st semester	2nd semester	
	Mathematical Analysis in Global Engineering	Tamura, T & Nishimura, N (ACCMS)	2		2
	Continuum Mechanics	Tamura, T & Nishimura, N (ACCMS)	2		2
	Numerical Structural Engineering	Watanabe, E, Matsumoto, M, Shirato, H & Utsunomiya, T		2	2
	Steel Structures	Watanabe, E, Sugiura, K & Utsunomiya, T		2	2
	Structural Analysis	Matsumoto, M & Shirato, H	2		2
	Material and Structural System	Miyagawa, T & Hattori, A	2		2
	Wind Engineering	Matsumoto, M & Shirato, H		2	2
	Concrete Structural Engineering	Miyagawa, T, Hattori, A & Inoue, S (Osaka Inst of Tech)		2	2
	Structural Design	Watanabe, E, Iemura, H & Utsunomiya, T	2		2
	Computational Fluid Dynamics	Nezu, I, Shirato, H & Ushijima, S		2	2
	Hydraulics and Fluid Mechanics	Nezu, I & Ushijima, S	2		2
	Dynamics of Sediment Transport	Nakagawa, H (DPRI), Yamashita, T (DPRI) & Fujita, M (DPRI)	2		2
	Turbulence Mechanics	Nezu, I & Ushijima, S		2	2
	River Management	Hosoda, T & Sumi, T	2		2
	Hydraulic Engineering for Disaster Prevention	Nakagawa, H (DPRI), Sawada, T (DPRI), Ishigaki, T (DPRI) & Yamashita, T (DPRI)	2		2
	Numerical Methods in Geomechanics	Oka, F & Kodaka, T	2		2

	Geomechanics	Oka, F	2		2
	Rock Mechanics	Saito, T & Asakura, T	2		2
	Waterfront Geotechnics	Iai, S (DPRI), Sekiguchi, H (DPRI) & Mimura, M (DPRI)		2	2
◎	Computational Geotechnics	Oka, F & Kodaka, T		2	2
	Exploration Geophysics	Ashida, Y, Matsuoka, T & Sugano, T	2		2
	Geological Engineering	Matsuoka, T & Hirano, I		2	2
	Crustal Development Engineering	Saito, T & Asakura, T		2	2
	Resources Development Systems	Hanasaki, K, Saito, T, Ashida, Y, Matsuoka, T, Sugano, T, Asakura, T, Hirano, I & Tsukada, K	2		2
	Numerical Methods in Geo-Dynamics	Hanasaki, K & Ashida, Y		2	2
	Inverse Theory with Application	Hanasaki, K & Tsukada, K	2		2
	Time Series Analysis	Matsuoka, T & Tsukada, K		2	2
◎	Computational Mechanics and Simulation	Hanasaki, K, Watanabe, E, Tamura, T, Miyagawa, T, Matsuoka, T, Nishimura, N (ACCMS), Hiraoka, H (ACCMS), Shirato, H, Ushijima, S, Sumi, T, Utsunomiya, T, Kodaka, T & Hattori, A	2		2
	Seminar on Structural Engineering	Watanabe, E, Matsumoto, M, Miyagawa, T, Shirato, H, Utsunomiya, T, Hattori, A & Tanaka, H (Hitz)		2	2
	Seminar on Hydraulic Engineering	Nezu, I, Ishigaki, T (DPRI), Fujita, M (DPRI), Ushijima, S & Sumi, T		2	2
	Seminar on Geotechnics	Oka, F, Iai, S (DPRI), Mimura, M (DPRI) & Kodaka, T		2	2
	Internship	Miyagawa, T, Hirano, I, Sumi, T &		2	2

		Kodaka, T			
	Infrastructure Engineering A	All related staffs	(3)	(3)	3
	Infrastructure Engineering B	All related staffs	(3)	(3)	3
★	Emergency Management Systems	Kawata, Y (DPRI) & Hayashi, H (DPRI)		2	2
◎	Introduction to High Technology Material Science	Related staffs	2		2
◎	New Engineering Materials, Adv.	Related staffs		2	2
	Master's thesis				

◎: Lectures given in English

★: Lectures given at other than Faculty of Engineering

1. Infrastructure Engineering A and B are prerequisite subjects.
2. More than four credits must be taken from Internship, Resources Development Systems, Seminar on Structural Engineering, Seminar on Hydraulic Engineering or Seminar on Geotechnics.
3. More than 30 credits must be taken, and to pass the examination for Master's thesis.
4. More than 20 credits must be taken from the subjects listed in the above table.

Brief explanation of subjects for Master's program

Mathematical Analysis in Global Engineering

Methods based on mathematical modeling and the analysis of the simulation results of the models are important for studying phenomena in natural and social sciences. Models for various physical phenomena considered in Department of Civil and Earth Resources Engineering can be classified into continuum models such as those found in solid and fluid mechanics, and discrete ones used in the study of earth materials etc. This class discusses fundamentals of mathematical analytical methods needed in the study of these models.

Continuum Mechanics

This class discusses the fundamentals of continuum mechanics including concepts used in elementary solid and fluid mechanics, constitutive relations, and the mathematical structure of the theory. It is suggested that the students willing to take class also consider taking Mathematical Analysis in Global Engineering since these subjects are closely related.

Numerical Structural Engineering

Some issues due to the descretization in the numerical structural analysis are addressed. Algorithms in the

matrix solvers of linear simultaneous equations, inverse matrix and the eigen-value problem will be overviewed. The stability analysis and the convergence of numerical solutions of the finite difference equations will be introduced. Finite Element Method (FEM) for structural analysis will also be lectured in detail in view of the theoretical aspect and practical implementations.

Steel Structures

Steel as a structural material have many advantages such as high strength, light weight, ease of fabrication, ductility, etc.; but also have disadvantages such as corrosion, susceptibility to buckling, fatigue, brittle fracture under certain conditions, etc. Therefore, important aspects for design of steel structures will be given in this lecture including static stability of slender structural members, corrosion, fatigue, brittle behavior, and details for welded connections, etc.

Structural Analysis

Theory of mechanics will be mathematically delivered as a fundamental knowledge for the structural analysis. Lagrange equation of motion is derived based on the Hamilton's principle and the variational treatment. Furthermore, conservation of energy, the first and the second theorem of Castigliano are explained by use of the reciprocal and canonical transformation (Friedrich or Legendre transformation) in the variational problem. The relationship between the boundary value problem and the variational problem as the Dirichlet's problem, the Hyper-circle problem and the statically equilibrium problem of three dimensional elastic body will be lectured as well.

Material and Structural System

Relations between microstructures of structural materials and engineering behaviors of structures are introduced based on theoretical and experimental discussions. Steel and concrete materials are mainly focused and influence of their properties on structural behavior and durability are discussed. Material design and maintenance methods to attain required performances of structures are lectured.

Wind Engineering

The aerodynamics of engineering structures such as bridges will be precisely introduced in connection with the fundamentals of bluff body aerodynamics. The steady and unsteady aerodynamic characteristics of various structures are delivered. Several actual wind-induced accidents/troubles are also explained from the points of bluff body aerodynamics.

Concrete Structural Engineering

Various properties of concrete, the most common material for infrastructures, including fresh behaviors, hardened behaviors, durability and structural behaviors of general and special concrete structures are discussed. Prognosis, assessment including inspection and investigation, diagnosis, remedial actions including repair, strengthening are introduced with consideration of strategic management based on the performance-based design method.

Structural Design

Methods of design for civil infrastructures as steel structures or concreter structures are given from the viewpoints of specifications, loads and strengths. Reliability of structures and the LRFD (Load Resistance Factors Design) theory are lectured. The concept of performance-based design will also be given.

Computational Fluid Dynamics

The course introduces the mathematical background for computational fluid dynamics (CFD) and practical computational methods to solve the conservation equations in fluid dynamics, which cover discretization, numerical schemes, algorithms and their actual applications. Vortex method as one of the CFD techniques tracing fluid particles in Lagrangean manner will be delivered with the introduction of computational algorithm. Some problems and the way of improvements during computation will be also pointed out. The course discusses the following topics: (1) Mathematics of partial differential equations and conservation equations in fluid dynamics, (2) Discretization of the governing equations with finite volume method (FVM) and finite difference method (FDM), (3) Numerical stability and accuracy of the discretized equations, (4) Algorithms to solve discretized equations, (5) Application to actual engineering problems. Students are required to complete homework including programming exercises.

Hydraulics and Fluid Mechanics

The course introduces basic and practical aspects in hydraulics in terms of fluid dynamics. Navier-Stokes equations and turbulence phenomena in 2D and 3D open channel flows are discussed with the emphasis on the open channel hydraulics. In addition, the course covers the resistance laws and sediment transportations in actual river flows as well as the recent topics on interfacial hydraulics between water and air.

Dynamics of Sediment Transport

This course aims to understand the multi-phase hydraulics, the mechanism of sediment transport, and prediction methods for the topographical changes in rivers and coasts together with application of sediment control. The main contents are dynamics of debris flows, sediment transportation models, riverbed variation models, and theory of coastal sediment transport and beach change prediction.

Turbulence Mechanics

The course discusses turbulence phenomena in terms of statistical and organized turbulence theories. The course also introduces the newest topics on the organized motions in turbulence phenomena, rather than completely random flows, that are main factors to cause turbulence diffusion and various turbulence transportations.

River Management

Basic concepts on flood control, water use and environment management in rivers and lakes are lectured. New trends and technologies on flood control planning, watershed management, hydrology, hydraulics and water environment in lakes and reservoirs, comprehensive management on sediment transport system, ecosystems in river basins, river embankment, hydraulic structures in rivers and underground rivers are presented by theory and practical examples.

Hydraulic Engineering for Disaster Prevention

Generation mechanism and prediction method of fluvial and marine disasters, such as river flood, debris flow, tsunami and storm surge, will be introduced on the scientific and technological basis, including case studies and observational/experimental techniques. Hydraulic engineering designs and plans for disaster prevention and reduction measures will also be expounded.

Numerical Methods in Geomechanics

The objective of the course is to equip students with a knowledge about fundamental numerical methods in geomechanics. The course will cover seepage flow, material transportation, consolidation, dynamic problem, progressive failure, and excavation. The numerical methods include finite element method, finite difference method, boundary element method, and discrete element method.

Geomechanics

The intention of the course is to provide students with state of the art of deformation and strength characteristics of geomaterials based on the granular mechanics and the multi-phase mixture theory. The course includes deformation and failure behavior of geomaterials, failure criteria, rate dependency, constitutive models, consolidation theory, liquefaction, and mechanism of the progressive failure.

Rock Mechanics

Earth resources development and utilization of underground construction requires better understanding of 1) mechanical properties of rock and rock mass, 2) measurement, analysis and evaluation of rock behavior, 3) design and construction methods of underground edifices. Each lecture utilizes the basic theory of rock mechanics and case studies.

Waterfront Geotechnics

This subject matter introduces graduate students to a state-of-the-art framework for a better understanding of the complex fluid-sediment interactions that operate in waterfronts. It starts with fundamentals of the Earth surface system, with special reference to liberation and flux of sediments. It then focuses on the nature of sediments: multi-phased and multi-scaled. This reasoning proves relevant and useful in addressing sediment delivery systems that connect rivers, estuaries and coastal oceans. The lecture in essence is a carefully designed blend of the dynamics of particulate gravity currents, saturated/unsaturated soil mechanics, sedimentology and introductory geo-informatics. The interdisciplinary approach is of relevance in addressing geomorphological and sedimentary environments of estuaries and shallow coastal oceans that are exposed to a wide spectrum of dynamical forcing such as floods, waves, tides, earthquake shaking and even landslide-generated tsunamis.

Computational Geotechnics (given in English)

The course provides students with the numerical modeling of clay, sand, soft rock. The course will cover reviews of the elastic, elasto-viscoplastic and elasto-plastic constitutive models and development of fully coupled finite element formulation for solid-fluid two phase materials. Students are required to develop a finite element program for solving boundary value problems such as consolidation and liquefaction processes.

Term project is the numerical analysis of consolidation or liquefaction of ground. At the end of the term, the project will be presented. Homework will be assigned during the term.

Exploration Geophysics

This class introduces the applications and principles of modern geophysical prospecting methods, in particular, reflection/refraction seismology and electric/electromagnetic methods. Lectures on the seismic methods include CDP surveys, data acquisition, processing and interpretation for 2D and 3D data, VSP, and elastic tomography. Those of the electric methods are of resistivity, Wenner, Schlumberger, dipole-dipole, and MT methods including EM modeling and inversion techniques.

Geological Engineering

In this lecture, features of the shallow crust and its formation process/mechanisms are outlined from the viewpoint of earth science and engineering. The following subjects are also described for earth resources development, underground development and construction, environmental preservation and disaster prevention: (1) Geological and geophysical exploration technology, and their applications. (2) Analysis and evaluation of geologic information. (3) Recent trends of R&D activities.

Crustal Development Engineering

This lecture gives an outline and recent trends of minerals and energy resources development/production, underground space development and its utilization for underground development. The methods of investigation, evaluation and maintenance technology of the underground environment for the development of resources and underground construction are reviewed using recent case studies.

Resources Development Systems

This is a survey course dealing with the origin, use, environmental impact of natural resources. The objectives of this course are to provide students a clear understanding of the geological context for the occurrence of mineral and energy resources on earth, and to review the current issues related to the exploration, exploitation and use of resources. Topics concerned with environmental remediation will be also presented.

Numerical Methods in Geo-Dynamics

Simulation techniques are widely applied not only for development and utilization of resources and energy, but global environmental preservation. The lecture reviews various simulation techniques for applications of geo-dynamics relating to geophysical subjects such as wave propagation and material translation. The lecture focuses on the basic theory and applications of Fourier analysis, finite difference method and finite element method, but also includes the distinct element method and molecule dynamics.

Inverse Theory with Application

This course presents the fundamentals of formulating and solving discrete inverse problems. There is an emphasis on understanding the basic difficulties involved in solving any inverse problem, and on practical methodologies for obtaining answers. Topics include: describing inverse problem, solutions to the linear

Gaussian inverse problem, generalized inverses, maximum likelihood methods, and application of vector spaces. Brief introduction to nonlinear inverse problem will be presented. Textbook: W. Menke, 1989, *Geophysical Data Analysis: Discrete Inverse Theory* (Revised Edition), Academic Press

Time Series Analysis

This course provides an introduction to the theory and practice of statistical time series analysis. Topics covered include stochastic process, non-parametric spectral analysis, autoregressive (AR), moving average (MA), ARMA and ARIMA models, and forecasting with these models. MATLAB is utilized in exercises to learn how to use the theory in practical data analysis. Individual project is an important component of this course. It could be a data analysis, a simulation study, or a report on a subject of student's own interest. Students are expected to give a presentation of their projects at the end of the course.
Course web page: http://www.kumst.kyoto-u.ac.jp/kougi/time_series/

Computational Mechanics and Simulation (given in English)

Computer language as FORTRAN, C and programming for numerical analysis in the field of computational mechanics are explained with the coding exercise using data processors. Developing codes with their verification, performance evaluation, post-processing technique will be asked. Parallel processing and system maintenance will be also introduced to understand computer-aided-engineering.

Seminar on Structural Engineering

Dynamic interaction phenomena for the system of structures and their surrounding medium (for example, fluid such as air and water) are widely lectured by plural lecturers. Moreover, by exemplifying real domestic and/or overseas big projects, engineering problems related to structural engineering are presented, and the methodologies for solving the engineering problems are given. Students are required to make presentations for their own research topics related to advanced technologies in structural engineering.

Seminar on Hydraulic Engineering

New topics on hydraulics and hydraulic engineering are widely lectured by basic theory and its application. 1) conservation of river and aquatic environment, and its relationship to water flows, 2) naturalized waterfront design, 3) field observation and data analysis on sediment yield and run-off in mountain areas, 4) practical studies on sediment related disasters and analysis of these mechanism, 5) dam hydraulics and reservoir sedimentation management and 6) analytical approach for multi-phase flow of water and sediment are presented. Students are required to choose one of these topics and make presentation on them for discussion.

Seminar on Geotechnics

This course provides students with analysis of measured date of ground related to investigations, design and construction of geotechnical engineering and laboratory testing. This course covers geotechnical problems arises at construction site and disaster prevention problems such as slope failure and liquefaction.

Internship

Thorough internship outside university on structural engineering, hydraulic engineering, geo and rock mechanics, and earth resources development engineering, fundamental skills such as practical engineering techniques, finding problems and solving them, reporting results and making presentation are mastered.

Infrastructure Engineering A

Advanced topics related to structural engineering, hydraulic engineering, geo and rock mechanics, and earth resources development engineering are chosen, and are discussed by plural supervisors to understand deeply on each topic. This is made basically by laboratory-based seminars.

Infrastructure Engineering B

Advanced topics related to structural engineering, hydraulic engineering, geo and rock mechanics, and earth resources development engineering are chosen, and are discussed by plural supervisors to understand deeply on each topic. This is made basically by laboratory-based seminars.

Emergency Management Systems

Disasters which may be considered as a function of the natural Hazards and the social Vulnerability are discussed. The social management system in order to prevent and reduce the natural disasters is also addressed.

Introduction to High Technology Material Science (given in English)

The various technologies used in the field of material science serve as the bases for the development of so called “high technologies.” Both the developments in material science and those in modern industries influence each other. In this course, recent developments in the field of material science are briefly introduced along with some current topics in new bio-materials, nuclear engineering materials, new metal materials and natural raw materials. Discussions are also held regarding the methods of material analysis and future developments in material science.

New Engineering Materials, Adv. (given in English)

New materials are necessary for the advancement of high technologies, but in order to develop these new materials for practical applications, a number of problems must be solved. In this course, the problems encountered in the practical applications of both the new materials and the raw materials in the fields of chemical engineering, electrical/electronic engineering, mechanical engineering and civil engineering are discussed. Discussions are also held on natural resources and how computers are being used in the development of new materials.

Subjects for Doctor's program

	Subjects	Teachers	Hours per week		credits
			1st semester	2nd semester	
○	Seminar on Infrastructure EngineeringA I	Watanabe, E, Ono, K, Matsumoto, M, Tamura, T, Miyagawa, T, Shirato, H, Utsunomiya, T & Hattori, A	2	2	4
□	Seminar on Infrastructure Engineering A II	Watanabe, E, Ono, K, Matsumoto, M, Tamura, T, Miyagawa, T, Shirato, H, Utsunomiya, T & Hattori, A	2	2	4
○	Seminar on Infrastructure Engineering B I	Nezu, I, Nakagawa, H (DPRI), Ishigaki, T (DPRI), Fujita, T (DPRI), Ushijima, S & Sumi, T	2	2	4
□	Seminar on Infrastructure Engineering B II	Nezu, I, Nakagawa, H (DPRI), Ishigaki, T (DPRI), Fujita, T (DPRI), Ushijima, S & Sumi, T	2	2	4
○	Seminar on Infrastructure Engineering C I	Saito, T, Ashida, Y, Oka, F, Iai, S (DPRI), Mimura, M (DPRI) & Kodaka, T	2	2	4
□	Seminar on Infrastructure Engineering C II	Saito, T, Ashida, Y, Oka, F, Iai, S (DPRI), Mimura, M (DPRI) & Kodaka, T	2	2	4
○	Seminar on Infrastructure Engineering D I	Hanasaki, K, Matsuoka, T, Sugano, T, Asakura, T, Hirano, I & Tsukada, K	2	2	4
□	Seminar on Infrastructure Engineering D II	Hanasaki, K, Matsuoka, T, Sugano, T, Asakura, T, Hirano, I & Tsukada, K	2	2	4

The subject with ○ will be given this year, and will not be given next year.

The subject with □ will not be given this year, and will be given next year.

Brief explanation of subjects for Docter's program

Seminar on Infrastructure Engineering A

Advanced topics and future prospects related to structural engineering are chosen, and are lectured by plural supervisors to understand deeply on each topic. Students are required to make their presentation based on their own research topics, in order to develop their research ability.

Seminar on Infrastructure Engineering B

Advanced topics and future prospects related to hydraulic engineering are chosen, and are lectured by plural supervisors to understand deeply on each topic. Students are required to make their presentation based on their own research topics, in order to develop their research ability.

Seminar on Infrastructure Engineering C

Advanced topics and future prospects related to geo and rock mechanics are chosen, and are lectured by plural supervisors to understand deeply on each topic. Students are required to make their presentation based on their own research topics, in order to develop their research ability.

Seminar on Infrastructure Engineering D

Advanced topics and future prospects related to earth resources development engineering are chosen, and are lectured by plural supervisors to understand deeply on each topic. Students are required to make their presentation based on their own research topics, in order to develop their research ability.

Researches in Department of Civil and Earth Resources Engineering

Department of Civil and Earth Resources Engineering deals with various research topics with intentions to contribute to the maintenance, restoration and construction of sustainable societies on the earth. Specifically, we investigate subjects such as the construction and maintenance of infrastructures, disaster prevention, environmental problems, and resource and the energy developments. We put particular stress on the improvement of analytical and predictive abilities for each components in the infrastructure from the standpoint of the computational and experimental mechanics. At the same time we promote investigations on the technological fundamentals for understanding huge systems ranging from earth's crust to the atmosphere, based on the state of the art technologies such as computational science, etc.

Laboratories and Faculty Staffs

Division	Sub-department	Professor	Associate Professor	Research Associate
Structural Engineering	Structural Mechanics	Eiichi Watanabe	Tomoaki Utsunomiya	Kazutoshi Nagata
	Bridge Engineering	Masaru Matsumoto	Hiromichi Shirato	Tomomi Yagi
				Keiko Anami
Structural Materials Engineering		Toyoaki Miyagawa	Atsushi Hattori	Takashi Yamamoto
Applied Mechanics		Takeshi Tamura	Tetsuya Sumi	Shunichi Kobayashi
Geotechnical and Hydraulic Engineering	Environmental Hydrodynamics	Iehisa Nezu	Satoru Ushijima	Michio Sanjou
	Geomechanics	Fusao Oka	Takeshi Kodaka	Sayuri Kimoto
Crustal Engineering	Geophysics	Yuzuru Ashida	Tsuyoshi Sugano	Yoshinori Sanada
	Engineering Geology	Toshifumi Matsuoka	Isamu Hirano	Yasuhiro Yamada
	Geo-Development Engineering	Toshiaki Saito	Toshihiro Asakura	Sumihiko Murata
	Geo-Mechatronics	Koichi Hanasaki	Kazuhiko Tsukada	Li Lingqi
Disaster Prevention Engineering (Disaster Prevention Research Institute, DPRI)	Erosion and Sediment Runoff Control Engineering	Kazuya Inoue	Masaharu Fujita	Daizo Tsutsumi
	Hydroscience and Hydraulic Engineering	Hajime Nakagawa	Taisuke Ishigaki	Tetsuo Ueno
				Yasunori Muto
				Yasuyuki Baba
	Geotechnics for Hazard Mitigation	Susumu Iai	Mamoru Mimura	Tetsuo Tobita
	Waterfront and Marine Geohazards	Hideo Sekiguchi	Takao Yamashita	Shigeru Kato
			Toyoaki Sawada	
Computational Mechanics (Academic Center for Computing and Media Studies, ACCMS)		Naoshi Nishimura	Hisashi Hiraoka	Hitoshi Yoshikawa

< Structural Mechanics >

Professor : **Eiichi Watanabe**

Biography

Qualifications

B. Sci.	Kyoto University, Japan 1964
M. Sci.	Kyoto University, Japan 1966
M. Sci.	Iowa State University, USA, 1968
Ph. D.	Iowa State University, USA, 1969
D. Eng.	Kyoto University, Japan, 1986

Academic Experience

1966-1969	RA and TA, Iowa State University
1970(January to March)	Research Associate, Kyoto University
1970(April)-1987(October)	Associate Professor, Kyoto University
1987(October)	Prof. of Civil Eng., Kyoto University
2003(April)	Prof. of Civil and Earth Resources Eng. Kyoto University

Honors & Awards

1966-1969	Fulbright Scholarship
1968	ΦΚΦ(Phi Kappa Phi) Honor Society
1969	ΣΨ (Sigma Psi) Honor Society
1998	Man of the Year 1998, ABI (American Biographical Institute)
2002	Best Paper's Medal (Japan Society of Civil Engineers)
2002	Inventor of *Remote Hybrid Testing System*: Patent No. 2000-214163

Professional Activities

**Science Council of Japan*:

Member of National Committee on Theoretical and Applied Mechanics

**European Academy of Sciences*: Member of Academy

**IUTAM, International Union Theoretical and Applied Mechanics (IUTAM)*:

Member of (1) Congress Committee & (2) General Assembly

Secretary General for ICTAM'96 (19th International Congress of Theoretical and Applied Mechanics), Kyoto (1996)

**Computational Structural Engineering Institute*

Editor-in-chief of the International J. of Comp. Structural Engineering

**Japan Society of Steel Construction (JSSC)*:

Member of Board of Directors

**Japan Society of Civil Engineers (JSCE)*:

Mem. of Board of Directors (1993-1995) / Secretary General of Kansai Chapter (1993-1995) /Chairman of Floating Bridges /Chairman of Corrosion

Protection and Assessment of Durability for Steel and Hybrid Structures

*IABMAS (International Association for Bridge Maintenance and Safety): Vice President/Co-chair of 2nd Conference of IABMAS, Kyoto, 2004)

Research Interests

1. Mechanical behavior of steel structures (buckling, deterioration, reliability)
2. Earthquake-resistant design of structures
   (seismic analysis, seismic reinforcement)
3 Steel and concrete hybrid structures (corrugated steel plate, etc.)
4. Monitoring and maintenance of steel structures
5. Cyber net testing and computation of structural systems
6. Offshore floating structures

Selected Publications

(Books)

*(Editor) Theoretical and Applied Mechanics 1996, Northholland, 1997

*Comp. Methods for Unbounded Domains, IUTAM, Kluwer Acad. Publishers, 1997

*Steel Design Technology, JSSC, 1998 (in Japanese)

*Structural Mechanics I, Maruzen, 1999 (July) (in Japanese)

*Structural Mechanics II, Maruzen, 2000 (in Japanese)

*(Ed.) Theoretical and Applied Mechanics, Vol. 50, Science Council of Japan, 2001

(Journals and Papers: including the following)

* E. Watanabe, K. Sugiura, K. Nagata, T. Yamaguchi and K. Niwa, Multi-phase interaction testing system by means of the Internet, Proc. 1st International Conf. on Advances in Structural Eng. and Mechanics, Vol. 1, pp.43-54, 1999.
* E. Watanabe and T. Utsunomiya, Analysis and Design of Floating Bridges, Progress in Structural Eng. & Mat., Vol. 3, No. 3, Wiley & Sons, Ltd., July-September 2003, pp 127-144
* E. Watanabe, S. Ueda, T. Maruyama & S. Takeda, Konstruction der Yumemai-Brucke-schwimmende Bogenbrucken in Osaka, 72, Heft 5, Shahlbau, Ernst & Sohn, 2003 (in German)
* C. Machimdamrong, E. Watanabe & T. Utsunomiya, An Extended Elastic Shear Deformable Beam Theory and Its Application to Corrugated Steel Web Girder, J. of Structural Eng., Vol.49A, pp 29-38, 2003.3.

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< Structural Mechanics >

Associate Professor : **Tomoaki Utsunomiya**

Biography

Qualifications

B. Eng., Kyoto University, 1985

M. Sc., Kyoto University, 1987

Dr. Eng., Kyoto University, 1990

Academic Experience

Associate Professor, Dept. Civil & Earth Res. Eng., Kyoto Univ., 2003.4-present

Associate Professor, Dept. Civil Eng., Kyoto University, 1997.4-2003.3

Senior Academic Visitor, Dept. Eng. Science, Univ. of Oxford, 1997.9-1998.9

Research Associate, Dept. Civil Eng., Kyoto University, 1991.4-1997.3

Honors & Awards

JSPS Research Fellow, 1989.4-1991.3

Invited Speaker in the Techno-Ocean 2002, Nov. 20-22, 2002, Kobe, Japan

Special Lecture at University of Oxford, UK, June 13, 2001

Special Lecture at National University of Singapore, March 25, 2002

Professional Activities

Member of the Research Committee on Floating Bridges, JSCE, 1998-present

Research Interest

Basic study on construction of infrastructures which utilize "Floating Structures". Especially, development of numerical analysis tools for dynamic response analysis of Very Large Floating Structures (VLFS) such as "Floating Bridge" and "Floating Airport".

Selected Publications

1) Watanabe, E., Utsunomiya, T. and Wang, C.M. “Hydroelastic analysis of pontoon-type VLFS: a literature survey,” Engineering Structures, 26 (2004) 245-256.

2) Utsunomiya, T. and Watanabe, E. “Wave response analysis of hybrid-type VLFS by accelerated BEM,” Hydroelasticity in Marine Technology, Ed. Eatock Taylor, R., 297-303 (2003).

3) Watanabe, E., Utsunomiya, T., Kuramoto, M., Ohta, H., Torii, T. and Hayashi,

N. “Wave response analysis of VLFS with an attached submerged plate,” Int. J. Offshore & Polar Eng., 13 (2003) 190-197.

4) Wang, C.M., Xiang, Y., Utsunomiya, T. and Watanabe, E. “Evaluation of modal stress resultants in freely vibrating plates,” Int. J. Solids & Structures, 23 (2001) 89-104.

5) Utsunomiya, T., Watanabe, E. and Nishimura, N. “Fast multipole algorithm for wave diffraction/radiation problems and its application to VLFS in variable water depth and topography,” Proc. 20th Int. Conf. on Offshore Mechanics and Arctic Eng. (2001) No. 5202.

6) Utsunomiya, T., Watanabe, E. and Nishimura, N. “Fast multipole method for hydrodynamic analysis of very large floating structures,” Proc. 16th Int. Workshop on Water Waves & Floating Bodies (2001) 161-164.

7) Watanabe, E., Utsunomiya, T. and Kubota, A. “Analysis of wave-drift damping of a VLFS with shallow draft,” Marine Structures, 13 (2000) 383-397.

8) Utsunomiya, T. and Eatock Taylor, R. “Resonances in wave diffraction/ radiation for arrays of elastically connected cylinders,” J. Fluids & Structures, 14 (2000) 1035-1051.

9) Utsunomiya, T. and Eatock Taylor, R. “Trapped modes around a row of circular cylinders in a channel,” J. Fluid Mech., 386 (1999) 259-279.

10) Utsunomiya, T. and Eatock Taylor, R. “Analogies for resonances in wave diffraction problems,” Proc. 13th Int. Workshop on Water Waves & Floating Bodies (1998) 159-162.

11) Kajita, Y., Utsunomiya, T. and Watanabe, E. “Finite element analysis for wave response of large floating structures,” Proc. JSCE, No.598/I-44 (1998) 161-170.

12) Utsunomiya, T., Watanabe, E. and Eatock Taylor, R. “Wave response analysis of a VLFS close to a breakwater,” Proc. 17th Int. Conf. on Offshore Mechanics & Arctic Eng. (1998) No. 4331.

13) Watanabe, E., Utsunomiya, T. and Tanigaki, S. “A transient response analysis of a very large floating structure by finite element method,” Structural Eng./Earthquake Eng., JSCE, 15 (1998) 155s-163s.

14) Wu, C., Watanabe, E. and Utsunomiya, T. “An eigenfunction expansion matching method for analyzing wave-induced response of an elastic floating plate,” Applied Ocean Research, 17 (1996) 301-310.

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< Structural Mechanics >

Research Associate : **Kazutoshi Nagata**

Biography

Qualifications

B. Eng., Gifu University, 1993

M. Sc., Kyoto University, 1995

Academic Experience

Research Associate, Dept. Civil & Earth Res. Eng., Kyoto Univ., 2003.4-present

Research Associate, Dept. Civil Eng., Kyoto University, 1997.9-2003.3

Professional Activities

Member of the Research Committee on Corrosion Protection of Steel and Composite Structures in Marine Environment, JSCE, 2003-present

Research Interest

I am studying the fundamental problems related to structural engineering through loading tests and numerical analyses for safe and functional infrastructures. My main research topics include elasto-plastic behavior of steel structures, seismic performances of elevated bridge system and development of the on-line parallel pseudo-dynamic testing by using the Internet technique.

Selected Publications

1) Kazutoshi Nagata, Eiichi Watanabe and Kunitomo Sugiura “Elasto-plastic response of box steel piers subjected to strong ground motions in horizontal 2 directions,” J. Structural Engineering, JSCE, 50A (in printing)
2) Hiromu Okamoto, Eiichi Watanabe, Kunitomo Sugiura and Kazutoshi Nagata “Load-carrying capacity of steel rigid-frame piers in the arbitrary horizontal direction,” J. Constructional Steel, Japanese Society of Steel Construction, 11 (2003) 373-378
3) Kazutoshi Nagata, Eiichi Watanabe, Kunitomo Sugiura, Yukio Adachi and Shigeki Okashiro “Collapse processes of steel rigid-frame piers subjected to in-plane horizontal loads,” J. Structural Engineering, JSCE, 49A (2003) 427-434
4) Takashi Yamaguchi, Kazutoshi Nagata and Yoshihiro Kishimoto “Simulation up to collapse of a simply supported elevation bridge supported by two piers made of different materials using network technology,” J. Structural

Engineering, JSCE, 49A (2003) 47-56

5) Eiichi WATANABE, Kazutoshi NAGATA, Masaki TAKEI, Kunitomo SUGIURA and Yukio ADACHI, “IN-PLANE BEHAVIOR AND COLLAPSE PROCESSES OF STEEL RIGID-FRAME PIERS,” Proc. the 2nd International Conference on Structural Stability and Dynamics (2002) 207-212

6) T.YAMAGUCHI, Y.KISHIMOTO, T.KITADA, K.NAGATA,E.WATANABE, K.SUGIURA “Development and Practical Application of Multi-Phase Pseudo-Dynamic Testing System by using the INTERNET,” IABSE symposium MELBORUNE (2002) CD-ROM

7) Kazutoshi Nagata, Eiichi Watanabe, Toshiyuki Kitada, Kunitomo Sugiura and Takashi Yamaguchi “Assessment on error propagation in response evaluation by parallel pseudo-dynamic testing system,” J. Structural Engineering, JSCE, 48A (2002) 35-42

8) Kazutoshi Nagata, Eiichi Watanabe, Kunitomo Sugiura, Masaki Takei and Yukio Adachi “Seismic behavior of steel rigid-frame piers,” J. Constructional Steel, Japanese Society of Steel Construction, 9 (2001) 353-358

9) Yoshihiro KISHIMOTO, Yoshikazu SUZUKA, Eiichi WATANABE, Toshiyuki KITADA, Takashi YAMAGUCHI, Kazutoshi NAGATA and Kunitomo SUGIURA “ Development of Parallel Pseudo-dynamic Testing System using Internet,” J. Civil Engineering Information Processing Symposium, JSCE, 9 (2000) 111-120

10) E. Watanabe, K. Sugiura, K. Nagata, T. Yamaguchi and K. Niwa “Multi-phase interaction testing system by means of the Internet,” Proc. the First International Conference on Advances in Structural Engineering and Mechanics, 1 (1999) 43-54

11) Kazutoshi Nagata, Eiichi Watanabe and Kunitomo Sugiura “Seismic Behavior and Dynamic Interaction of Elevated Bridge System Consisting of Steel and RC Piers,” J. Structural Engineering, JSCE, 45A (1999) 727-736

12) E. Watanabe, K. Sugiura, K. Nagata and Y. Kitane “Performances and damages to steel structures during the 1995 Hyogoken-Nanbu Earthquake,” Engineering Structures, ELSEVIER, 20 (1998) 282-290

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< Bridge Engineering >

Professor : Masaru Matsumoto

Biography

Qualifications

B. Eng., Kyoto University, 1967
M. Sc., Kyoto University, 1969
Dr. Eng., Kyoto University, 1973

Academic Experience

Director, Advanced Research Institute of Fluid Science and Engineering, Int'tech Center, Kyoto Univ., 2003.4-present
Professor, Dept. Civil & Earth Res. Eng., Kyoto Univ., 2003.4-present
Professor, Dept. Global Environment Eng., Kyoto University, 1997.1-2003.3
Associate Professor, Dept. Civil Eng., Kyoto University, 1976.4-1996.12
Lecturer, Dept. Civil Eng., Kyoto University, 1973.4-1976.3
Research Associate, Dept. Civil Eng., Kyoto University, 1972.4-1973.3

Honors & Awards

Tanaka Award, Division of Outstanding Research Publication, from Japan Society of Civil Engineers, 1990
Association Award (Division of Research Paper) of Japan Association for Wind Engineering, 1997
Invited Speaker, 10th International Conference on Wind Engineering, Copenhagen, Denmark, June 21-24, 1999.
Invited Speaker, First International Symposium on Wind and Structures for 21st Century, Cheju, Korea, January 26-28, 2000.
Prize of Progress from the Institute of Electrical Engineers of Japan, 2001

Professional Activities

Associate Editor, Journal of Fluids and Structures, 1997-present
Member of Natural Disaster Engineering, Science Council of Japan, 1998-present
Editors-in-Chief , Journal of Wind and Structures, 2001-present
Member of Technical Committee, Honshu-Shikoku Bridge Authority, 2001-present
President, Japan Association for Wind Engineering, 2002-present
Executive Board, International Association for Wind Engineering, 2003-present

Research Interest

Wind-induced instabilities of structures including long-span bridges and

development of new types of bridge structures assembled with standardized parts are major themes. For the former topic, the flutter phenomena of long-span bridges, the wind-induced vibrations of stay cables and the improvement in estimation of the buffeting response are especially investigated.

Selected Publications

1) Matsumoto, M., Yagi, T., Goto, M. and Sakai, S.: Rain-wind-induced vibration of inclined cables at limited high reduced wind velocity region, Journal of Wind Engineering and Industrial Aerodynamics, Vol. 91, pp.1-12, 2003
2) Matsumoto, M., Shirato, H., Yagi, T., Goto, M., Sakai, S. and Ohya, J.: Field observation of the full-scale wind-induced cable vibration, Journal of Wind Engineering and Industrial Aerodynamics, Vol. 91, pp.13-26, 2003
3) Matsumoto, M., Shirato, H., Araki, K., Haramura, T. and Hashimoto, T.: Spanwise coherence characteristics of surface pressure field on 2-D bluff bodies, Journal of Wind Engineering and Industrial Aerodynamics, Vol. 91, pp.155-163, 2003
4) Matsumoto, M., Shirato, H., Yagi, T., Shijo, R., Eguchi, A. and Tamaki, H.: Effects of aerodynamic interferences between heaving and torsional vibration of bridge decks: the case of Tacoma Narrows Bridge, Journal of Wind Engineering and Industrial Aerodynamics, Vol. 91, pp.1547-1557, 2003
5) Matsumoto, M., Taniwaki, Y. and Shijo, R.: Frequency characteristics in various flutter instabilities of bridge girders, Journal of Wind Engineering and Industrial Aerodynamics, Vol. 90, pp. 1973-1980, 2002
6) Matsumoto, M., Yagi, T., Shigemura and Y., Tsushima, D.: Vortex-induced cable vibration of cable-stayed bridges at high reduced wind velocity, Journal of Wind Engineering and Industrial Aerodynamics 89, pp.633-647, June, 2001
7) Matsumoto, M., Shirato, H. and Yagi, T.: Recent topics on bridge aerodynamics, Wind and Structures, Vol. 3, No. 4, pp267-277, December, 2000
8) Matsumoto, M.: Vortex shedding of bluff bodies: a review, Journal of Fluids and Structures, Vol.13, No.7/8, pp.791-811, October, 1999
9) Matsumoto, M., Yoshizumi, F., Yabutani, T., Abe, K. and Nakajima, N.: Flutter stabilization and heaving-branch flutter, Journal of Wind Engineering and Industrial Aerodynamics 83, pp.289-299, November, 1999

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< Bridge Engineering >

Associate Professor : Hiromichi Shirato

Biography

Qualifications

B. Eng., Kyoto University, 1979

M. Sc., Kyoto University, 1981

Dr. Eng., Kyoto University, 1989

Academic Experience

Associate Professor, Dept. Civil & Earth Res. Eng., Kyoto Univ., 2003.4-present

Associate Professor, Dept. Global Environment Eng., Kyoto University, 1997.7-2003.3

Research Associate, Dept. Global Env. Eng., Kyoto University, 1991.4-1997.6

Visiting Scholar, Institute of Hydrology and Water Resources, University Karlsruhe, Germany, 1988.11-1989.11

Research Associate, Dept. Civil Eng., Kyoto University, 1981.4-1991.3

Honors & Awards

Japan Association for Wind Engineering Award (Research Publication), May 27, 2003

Tanaka Award (Research Publication), May, 1990

Professional Activities

Member of the Technical Committee on Wind Resistance Design of Strait Crossing Long-Span Bridges in Japan, Bridges and Offshore Engineering Association, 2002-present

Member of the Technical Committee on Aerodynamic Design of Road Bridges, Japan Road Association, 2000-present

Research Interest

Experimental and analytical study on mechanism of aerodynamic phenomena of engineering structures has been investigated as a major research theme. Spatially correlated structure of aerodynamic forces and surface pressure is especially focused recently. Aerodynamic forces due to oncoming wind fluctuation and their relationship with surrounding flow patterns as well as with the surface pressure characteristics are also on-going research project. Results and some findings will contribute to the development of the advanced evaluation

technology of buffeting phenomenon.

Selected Publications

1) Matsumoto, M., Shirato, H., Araki, K., Haramura, T. and Hashimoto, T.: Spanwise coherence characteristics of surface pressure field on 2-D bluff bodies, J. of Wind Engineering and Industrial Aerodynamics, Vol. 91, pp.155-163, 2003
2) Matsumoto, M., Shirato, H., Haramura, T., Odawara, Y. and Matsuura, Y.: Spatial coherence of pressures around two dimensional sections in fluctuating flow, Proc. of 17th National Symposium on Wind Engineering, pp.243-248, 2002 (In Japanese)
3) Matsumoto, M., Shirato, H, Yagi, T., Jones, N.P. and Hayashi, T.: Field observation system of cable aerodynamics in natural wind, Proc. of the Fourth Int. Symp. on Cable Dynamics, Montreal, Canada, pp.219-225, May, 2001
4) Matsumoto, M., Shirato, H., Araki and Haramura, T.: Spatial coherence of fluctuating wind velocities and pressures around two dimensional sections, Proc. of 16th Nat. Symp. on Wind Engineering, Tokyo, pp.261-266, 2000 (In Japanese)
5) Matsumoto, M. and Shirato, H: Some application of vortex method to wind engineering problem, Vortex Methods, Selected Papers of the First Int. Conf. on Vortex Methods, Kobe, Japan, 4-5 November 1999, Edited by Kyoji Kanemoto, Michihisa Tsutahara, World Scientific, pp.204-211, January, 2000
6) Matsumoto, M., Shirato, H and Honma, S.: 2D rectangular cross section aerodynamics in various incidence angle of wind, Flow-Induced Vibration, Proc. of the 7th Int. Conf. on Flow-Induced Vibration, Lucerne, Switzerland, Edited by Samir Ziada, Thomas Staubli, Balkema, pp.115-121, June, 2000
7) Matsumoto, M., Shirato, H and Yagi, T.: Strong wind disasters around Nara basin in September 1998 due to typhoon 9807, The Annuals of the Disaster Prevention Research Institute, Kyoto University, No.42 B-1, April 1999, pp.275-287 (In Japanese)

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< Bridge Engineering >

Research Associate : Tomomi Yagi

Biography

Qualifications

B. Eng., Kyoto University, 1990

M. Sc., Kyoto University, 1992

Licentiate of Eng., Royal Institute of Technology, Sweden, 1994

Ph.D., Royal Institute of Technology, Sweden, 1997

Academic Experience

Research Associate, Dept. Civil & Earth Res. Eng., Kyoto Univ., 2003.4-present

Research Associate, Dept. Global Env. Eng., Kyoto University, 1997.7-2003.3

Research Interest

The major field of research is wind-induced instabilities of structures. Especially, the mechanism of wind-induced vibrations of bridges and the development of their countermeasures are investigated. Also, the mitigation of wind-induced disasters due to the typhoons and the tornados is another research topic.

Selected Publications

1) Matsumoto, M., Shirato, H., Yagi, T., Shijo, R., Eguchi, A. and Tamaki, H.: Effects of aerodynamic interferences between heaving and torsional vibration of bridge decks: the case of Tacoma Narrows Bridge, Journal of Wind Engineering and Industrial Aerodynamics, Vol. 91, pp.1547-1557, 2003
2) Matsumoto, M., Yagi, T., Sakai, S., Ohya, J. and Okada, T.: Investigation on steady wind force coefficients of inclined cables and their application to aerodynamics, Proceedings of the Fifth International Symposium on Cable Dynamics, Santa Margherita Ligure, Italy, September 15-18, 2003, pp.287-294, 2003
3) Matsumoto, M., Yagi, T., Sakai, S., Ohya, J. and Okada, T.: Field observations of wind-induced cable vibrations using large-scale inclined cable model, Proceedings of the Eleventh International Conference on Wind Engineering, June 2-5, 2003, pp.2149-2156, 2003
4) Matsumoto, M., Yagi, T., Goto, M. and Sakai, S.: Rain-wind-induced vibration of inclined cables at limited high reduced wind velocity region,

Journal of Wind Engineering and Industrial Aerodynamics, Vol. 91, pp.1-12, 2003

5) Matsumoto, M., Shirato, H., Yagi, T., Goto, M., Sakai, S. and Ohya, J.: Field observation of the full-scale wind-induced cable vibration, Journal of Wind Engineering and Industrial Aerodynamics, Vol. 91, pp.13-26, 2003
6) Masaru Matsumoto, Tomomi Yagi, Seiichiro Sakai, Jun Ohya, Takao Okada: On cable aerodynamics - field observation and wind tunnel test, Proceedings of the Second International Symposium on Advances in Wind & Structures, pp. 289-296, 2002
7) Matsumoto, M., Yagi, T., Sakai, S., Ohya, J. and Okada, T.: On cable aerodynamics - field observation and wind tunnel test, Proceedings of the Second International Symposium on Advances in Wind & Structures, pp. 289-296, 2002
8) Matsumoto, M., Yagi, T., Shigemura and Y., Tsushima, D.: Vortex-induced cable vibration of cable-stayed bridges at high reduced wind velocity, Journal of Wind Engineering and Industrial Aerodynamics 89, pp.633-647, June, 2001
9) Masaru Matsumoto, Tomomi Yagi, Mitsutaka Goto, Seiichiro Sakai: Cable aerodynamic vibration at high reduced velocity, Proceedings of the Fourth International Symposium on Cable Dynamics, Montreal, Canada, pp.43-50, May, 2001
10) Matsumoto, M., Yagi, T., Shigemura, Y. and Tsushima, D.: Vortex-induced cable vibration of cable-stayed bridges at high reduced wind velocity, Journal of Wind Engineering and Industrial Aerodynamics 89, pp.633-647, 2001
11) Matsumoto, M., Shirato, H. and Yagi, T.: Recent topics on bridge aerodynamics, Wind and Structures, Vol. 3, No. 4, pp267-277, December, 2000
12) Matsumoto, M., Yagi, T., Tsushima, D. and Shigemura, Y.: Vortex-induced vibration of inclined cables at high wind velocity, Wind Engineering into the 21st Century, Proceedings of the Tenth International Conference on Wind Engineering, Copenhagen, pp.979-986, June, 1999

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Research Associate : Keiko Anami

Biography

Qualifications

B.S., Osaka Electro-Communication University, 1997

M.S., Osaka Electro-Communication University, 1999

Dr. Eng., Osaka Electro-Communication University, 2002

Academic Experience

Research Associate, Dept. Civil & Earth Res. Eng., Kyoto Univ.,2003.4-present

Research Associate, Dept. Global Environment Eng., Kyoto Univ., 2002.4-2003.3

Honors & Awards

Hatakeyama Award, *JSME*, Tokyo, Japan, 1997.3.23

JSME Young Engineers Award, *JSME*, Tokyo, Japan, 2003.4.12

Certificate of Merit for Outstanding Presentation, *Dynamics, Measurement and Control Division, JSME*, Nagasaki, Japan, 2003.9.18

Research Interest

A huge Tainter gate at Folsom Dam in California induced vibrations and failed, early in the morning on July 17, l995. In order to prevent the recurrence of the serious accident and to assure the safety of operation, theoretical and experimental research on the flow-induced vibration of Tainter gate is carrying out.

Selected Publications

1) Anami, K., Ishii, N., Takano, W.: Theoretical Analysis of Flow-Induced Streamwise Rotating Vibration of Inclined Circular-Arc Rigid Skinplate and Its Verification by Model Tests, Trans. of JSME, C, (2004-2), (in Japanese).
2) Anami, K. and Ishii, N.: Model Tests for Non-Eccentricity Dynamic Instability Closely Related to Folsom Dam Tainter-Gate Failure, Symposium on Flow-Induced Vibration 2003, Proc. of ASME PVP Conference, Vol.465, 213-221, Cleveland, Ohio, USA, (2003-7).
3) Anami, K., Ishii, N., Takano, W.: Empirical evaluation method of hydrodynamic pressures induced by vibrations of inclined circular-arc skinplate of Tainter gates, Journal of Structural Engineering, Vol.49A, 645-651, (2003-3), (in Japanese).

4) Anami, K., Ishii, N., Takano, W.: Equivalent Added mass and Wave-Radiation Damping Coefficients for Flow-Induced Rotational Vibrations of Vertical Weir Plate, Trans. of JSME, B, 68-668, 1072-1079, (2002-4), (in Japanese).
5) Anami, K. and Ishii, N.: Model Tests for Hydrodynamic Pressure Caused by Vibrations of a Vertical Flat Weir Plate and Verification of Theoretical Analysis, Trans. of JSME, B, 68-662, 719-725, (2002-3), (in Japanese).
6) Nakata, A., Ishii, N., Tokushima, K., Anami, K., Kusano, I.: A Study on Discharge Flow from Vibrating Sluice Gates for Calculating Hydrodynamic Pressure, Proceedings of ASME PVP Conference, Vol. 420-2, 151-156, Atlanta, Georgia, USA, (2001-7).
7) Nakata, A., Ishii, N., Tokushima, K., Anami, K. and Kusano, I.: Characteristics of discharge flow from vibrating gates and examinations of theoretical calculation on hydrodynamic pressure, Journal of Structural Engineering, Vol.47A, 951-956, (2001-3), (in Japanese).
8) Anami, K., Ishii, N. and Yamasaki, M.: Hydrodynamic Pressure Induced by Rotating Skinplate of Folsom Dam Tainter-Gate, Trans. of JSME, B, 66-652, 3116-3123, (2000-12), (in Japanese).
9) Anami, K., Ishii, N., Knisely, C.W. and Matsumoto, Y.: Measured and Calculated Vibration Characteristics of a Full-Scale Flap Gate Undergoing Self-Excited Vibration, Proceedings of ASME PVP Conference, Vol. 414-1, 23-29, Seattle, Washington, USA, (2000-7).
10) Anami, K. and Ishii, N.: Flow-Induced Dynamic Instability Closely Related to Folsom Dam Tainter-Gate Failure in California, in *Flow Induced Vibration* (eds. Ziada S. & Staubli T.), 205-212, Balkema, (2000-6).
11) Anami, K. and Ishii, N.: Flow-Induced Coupled-Mode-Vibration of Folsom Dam Tainter-Gates in California, Proceedings of ASME PVP Conference, Vol. 396, 343-350, Boston, Massachusetts, USA, (1999-8).
12) Anami, K. and Ishii, N.: In-Air and In-Water Natural Vibrations of Folsom Dam Radial Gate in California, in *Experimental Mechanics 1 (Advances in design, testing and analysis)* (ed. Allison I.M.), 29-34, Balkema, (1998-8).
13) Anami, K. and Ishii, N.: In-Water Streamwise Vibration of Folsom Dam Radial Gates in California, Proceedings of ASME PVP Conference, Vol. 363, 87-94, San Diego, California, USA, (1998-7).

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< Structural Materials Engineering >

Professor : Toyoaki Miyagawa

Biography

Qualifications

B. Eng., Kyoto University, 1973

M. Sc., Kyoto University, 1975

Dr. Eng., Kyoto University

Academic Experience

Professor, Dept. Civil & Earth Res. Eng., Kyoto Univ., 2003.4-present

Professor, Dept. Civil Eng., Kyoto University, 1998.5-2003.3

Senior Academic Visitor, Dept. Civil Eng., Aston Univ., 1991.10-1992.8

Associate Professor, Dept. Civil Eng., Kyoto University, 1991.4-1998.4

Lecturer, Dept. Civil Eng., Kyoto University, 1989.6-1991.3

Research Associate, Dept. Civil Eng., Kyoto University, 1975.4-1989.5

Honors & Awards

Special Lecture at Aston University, UK, 1992.7

Keynote Speaker at 6th Int. Conf. On Inspection, Appraisal, Repairs and Maintenance of Structures, Melbourne, 1999.12

Keynote Speaker at 8th Int. Conf. On Inspection, Appraisal, Repairs and Maintenance of Structures, Singapore, 2003.12

Japan Concrete Institute Award, 2000.5

Japan society of Civil Engineers Award, 2001.5

Professional Activities

Chairman of Committee on Corrosion and Corrosion Protection of Concrete Structure, JSCE, 1995.4-1999.3

Chairman of Working Group on Standard Specification for Concrete Structures, JSCE, 1999.4-present

Chairman of Committee on Electro Chemical Corrosion Protection of Concrete Structures, JSCE, 2000.4-2002.3

Chairman of Polymers in Concrete Committee, JSMS, 2001.3-present

Research Interest

Concrete structure is an important and excellent structural form to support the facilities of the infrastructure. To maintain the sustainable and feasible

development of infrastructure, a scenario for concrete structures are being developed by the construction of life cycle management system of concrete structure and establishment of time-dependent reliability assessment techniques.

Selected Publications

1) Miyagawa, T., Funakawa, I., Ushijima, S. and Otsuki, N. "Electrochemical Corrosion Protection in Japan," Proc. of 8th International Conference on Inspection, Appraisal, Repairs & Maintenance of Structure, (2003) 1-12.
2) Kato, H., Miyagawa, T., Nakamura, A. and Doi, H. "Influence of Gypsum on Behavior of Chloride Ion and Steel Corrosion in Mortar with Ground Granulated Blast-Furnace Slag," Proc. JSCE, No.746/V-61, (2003)1-12.
3) Kobayashi, K., Hirasawa, I. and Miyagawa, T. "Numerical Analysis of Macro-Cell Corrosion caused by Cracks in Cover Concrete by Using Electrochemical Properties of Steel Bar," Proc. JSCE, No.746/V-61, (2003)71-90.
4) Nakagawa, M., Takagi, T., Hattori, A. and Miyagawa, T. "Experimental Study on Inspection of Carbonation-induced Re-bar Corrosion with Electro-chemical Measurement," Proc. the Concrete Structure Scenarios, JSMS, 3, (2003)223-230.
5) Aramaki, S., Matsushita, S., Hattori, A. and Miyagawa, T. "Movement of Mixed Chloride Due to Carbonation," Proc. the Concrete Structure Scenarios, JSMS, 3, (2003)297-304.
6) Miyagawa, T., Masuda, Y., Hamada, H., Demura, K., Noguchi, T., Moriwake, A. and Ueda, T. "Maintenance System of Concrete Structures Deteriorated by Complex," Proc. 1st fib congress, 8, (2002)79-86.
7) Miyagawa, T., Otsuki, N., Morikawa, H., Moriwake, A. and Hamada, H. " JSCE - standard specification for concrete structures – 2001," Proc. 1st fib congress, 8, (2002)159-166
8) Miyagawa, T., Masuda, Y., Demura, K. and Moriwake, A. "Design System for Rehabilitation of Concrete Structures Damaged by Chloride Induced Corrosion," Proc. of 6th International Conference on Inspection, Appraisal Repairs & Maintenance of Buildings & Structures, (1999) 267-280.

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< Structural Materials Engineering >

Associate Professor : Atsushi Hattori

Biography

Qualifications

B. Eng., Kyoto University, 1990

M. Sc., Kyoto University, 1992

Dr. Eng., Kyoto University, 2000

Academic Experience

Associate Professor, Dept. Civil & Earth Res. Eng., Kyoto Univ., 2003.4-present

Associate Professor, Dept. Civil Eng., Kyoto University, 2000.6-2003.3

Research Associate, Dept. Civil Eng., Kyoto University, 1992.4-2000.5

Honors & Awards

JSCE incentive prize, 1995

JSMS incentive prize, 1996

JCI incentive prize, 1999

Professional Activities

Member of the Research Committee on Concrete Structures in JSCE, JCI and JSMS

Member of Technical Committee in Ministry of Land, Infrastructure and Transport, and Hanshin Expressway Public Corporation

Research Interest

Aiming at the sustainable development of infrastructure, investigations on the various necessary techniques are under development. These include the applications of fiber reinforced plastics and eco-materials, deterioration prediction simulation and performance assessment of the existing structures, and health evaluation by the non-destructive test etc.

Selected Publications

1) Lin An, Takashi Yamamoto, Atsushi Hattori, Toyo Miyagawa: Investigation of Corrosion Behavior and Grouting Degree of Sheath-Grout-Tendon Element by Electrochemical Method, Proc. of the 8th International Conference on Inspection, Appraisal, Repairs, and Maintenance of Structures, pp.195-202, 2003.12

2) Atsushi Hattori, Yoshimori Kubo, Takashi Yamamoto, Toyoaki Miyagawa: Application of CFRP Sheet Wrapping for RC Member Subjected to ASR, Proceedings of the 16th KKCNN Symposium on Civil Engineering, pp.179-184, 2003.12
3) Lin An, Takashi Yamamoto, Atsushi Hattori, Toyoaki Miyagawa: Comparative Analysis on Stress Calculation Methods for External FRP Cables, Proc. of 6th International Symposium on Fibre-Reinforced Polymer (FRP) Reinforcement for Concrete Structures (FRPRCS-6), Vol. 2, pp.995-1002, 2003.7
4) Atsushi Hattori, Shin Yamamoto, Yoshimori Kubo, Toyoaki Miyagawa: ASR Expansion Reduction and Ductility Improvement by CFRP Sheet Wrapping, Proc. of 6th International Symposium on Fibre-Reinforced Polymer (FRP) Reinforcement for Concrete Structures (FRPRCS-6), Vol. 2, pp.815-822, 2003.7
5) Atsushi Hattori, Shin Yamamoto, Yoshimori Kubo, Toyoaki Miyagawa: Expansion and Flexural Behavior of RC Beam Wapped with CFRP Sheet Subjected to ASR, Proc. of the Third International Symposium on Structural Composites for Infrastructure Applicatoins, 2002.12
6) Lin An, Takashi Yamamoto, Atsushi Hattori, Toyoaki Miyagawa: Review of Stress Increment in Externally Prestressing Cables, Proc. of the Fourth International Summer Symposium, International Activities Committee, JSCE, pp.59-62, 2002.8
7) Atsushi Hattori, Toyoaki Miyagawa: Performance Prediction of RC Beams Subjected to Chloride Attack, Proc. of the 14th KKNN Symposium on Civil Engineering, pp.335-340, 2001.11
8) Atsushi Hattori, Toyoaki Miyagawa: Prediction of Degradation and Performance in RC Beams Subjected to Chloride Attack by Corrosion Monitoring, Proc. of 7th International Conference on Inspection, Appraisal, Repair & Maintenance of Buildings & Structures, Vol. 2, pp.81-88, 2001.9
9) Yoshimori KUBO, Atsushi HATTORI, Toyo MIYAGAWA, Shinsuke KURIHARA: Influence of Water Content of Concrete on Surface Treatment for Reduction of Alkali-Silica Expansion, Proc. of 2001 Second International Conference on Engineering Materials, Vol.2, pp.631-638, 2001.8
10) Atsushi HATTORI, Yoshinori OHNISHI, Toyoaki MIYAGAWA: Durability of FRP Sheet Used for Concrete in Sulphuric Acid Environment, Proceedings of the 5th International Conference on Fiber-Reinforced Plastics for Reinforced Concrete Structures, Vol.1, pp.489-495, 2001.7
11) Atsushi Hattori, Toyoaki Miyagawa: Durability of FRP Sheet-Strengthened Concrete Structures, Proc. of the 13th KKNN Symposium on Civil Engineering, pp.81-86, 2000.12

12) Koichi Kobayashi, Yoshihiro Watanabe, Atsushi Hattori, Toyoaki Miyagawa: Corrocion of Steel Bars in Chloride-Contaminated Concrete Member Patched with Self-Compacting Concrete, Concrete Library of JSCE, No.35, pp.169-183, 2000.7
13) Yoshimori Kubo, Atsushi Hattori, Shinsuke Kurihara, Toyo Miyagawa: Long Term Effect of Silane treatments on Expansion Due to Alkali-Silica Reaction by Water Control, Proc. of 11th ICAAR, pp.1069-1078, 2000.6
14) Atsushi Hattori, Akiko Etoh, Yoshinori Ohnishi, Toyoaki Miyagawa: Evaluation of Concrete with FRP Sheet under Accelerated Degradation Environments, Proc. of Non-Destructive Testing in Civil Engineering 2000, pp.443-452, 2000.4
15) Y. Hamada, H. Sakai, H. Tasaka, A. Hattori, T. Miyagawa, M. Mashima: Probabilistic Study on the Tensile Strength of Multiple-FRP Tendons, Proc. of FRAMCOS-3, Volume III, pp.1883-1892, 1998.10
16) Rowland V. Shitindi, Yuji Kato, Atsushi Hattori, Toyoaki Miyagawa: Stress-Strain Behavior of Concrete Confined by FRP, Material Science Research International, JSMS, Vol.4, No.3, pp.163-170, 1998.9
17) Takao Ueda, Atsushi Hattori, Toyoaki Miyagawa, Manabu Fujii, S. Mizoguchi, M. Ashida: Influence of Desalination on Behavior of Prestressing Steel, Proc. of 4th CANMET/ACI/JCI Int'l Sym. On Advances in Concrete Technology, pp.283-300, 1998.6
18) Yoshimori Kubo, Atsushi Hattori, Toyoaki Miyagawa, Koji Hori: Water Control Properties of Silane Treatment, Proc. of 4th CANMET/ACI/JCI Int'l Sym. On Advances in Concrete Technology, pp.255-269, 1998.6
19) Takao Ueda, Atsushi Hattori, Masanobu Ashida, Toyoaki Miyagawa: Influence of Desalination on Bond Behavior between Concrete and Reinforcing Steel, Concrete Library International, No.30, pp.81-94, 1997.12
20) Atsushi Hattori, Koji Kawasaki, Toyoaki Miyagawa: Bond of Fiber Composite ReBars Embedded in Concrete, Proc. Of the 7th KAIST-NTU-KU Tri-Lateral Seminar/Workshop on Civil Engineering, pp.227-232, 1997.12

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Research Associate : Takashi Yamamoto

Biography

Qualifications

B. Eng., Kyoto University, 1996

M. Sc., Kyoto University, 1998

Dr. Eng., Kyoto University, 2001

Academic Experience

Research Associate, Dept. Civil and Earth Res. Eng., Kyoto Univ., 2003.4-present

Research Associate, Dept. Civil Eng., Kyoto University, 2001.4-2003.3

Honors & Awards

JSMS incentive prize, 2003

Professional Activities

Member of Sub-committee on the countermeasures for the damage due to alkali silica reaction in JSCE Concrete committee, 2003.4-present

Research Interest

The prediction approaches are being developed for the time-dependent mechanical characteristics of concrete structures under various loading and environmental conditions. Meanwhile, repair and strengthening techniques for retrofitting or upgrading the load carrying capacity and durability are also being investigated at present.

Selected Publications

1) Yamamoto, T., Hattori, A., and Miyagawa, T., “Strengthening with CFRP Sheet for RC Flexural Member Deteriorated by Reinforcing Steel Corrosion”, Proc. of the 8th International Conference on Inspection, Appraisal, Repairs, and Maintenance of Structure, pp.351-358, 2003.12
2) An, L., Yamamoto, T., Hattori, A., and Miyagawa, T., “Investigation of Corrosion Behavior and Grouting Degree of Sheath-Grout-Tendon Element by Electrochemical Method”, Proc. of the 8th International Conference on Inspection, Appraisal, Repairs, and Maintenance of Structures, pp.195-202, 2003.12

3) An, L., Yamamoto, T., Hattori, A., and Miyagawa, T., “Comparative Analysis on Stress Calculation Methods for External FRP Cables”, Proc. of 6th International Symposium on Fibre-Reinforced Polymer (FRP) Reinforcement for Concrete Structures (FRPRCS-6), Vol. 2, pp.995-1002, 2003.7
4) Yamamoto, T., Hattori, A., and Miyagawa, T., “Influence of Reinforcing Steel Corrosion on Flexural Behavior of RC Member Confined with CFRP Sheet”, Proceedings of the first fib Congress 2002, pp.177-182, 2002.10
5) Yamamoto, T., Nakamura, R., Ozawa, K., and Ito, H., “Cathodic Protection and Strengthening using Carbon Fiber Sheet for RC Member”, Proceedings of the Japan Concrete Institute, Vol.24, No.1, pp.1695-1700, 2002.6
6) Yamamoto, T., Hattori, A., and Miyagawa, T., “A Study of RC Members Strengthened with a Longitudinally Prestressed Concrete Jacket”, Concrete Library of JSCE, No.39, pp.203-217, 2002.6
7) Yamamoto, T., Hattori, A., and Miyagawa, T., “Load Carrying Behavior of RC Member Strengthened with CFRP Sheet Subjected to Reinforcing Steel Corrosion”, Journal of the Society of Materials Science, Japan, pp.877-882, 2001.8
8) Yamamoto, T., Hattori, A., and Miyagawa, T., “Flexural Behavior of RC Members Strengthened by Longitudinally Prestressed Concrete Jacket”, Proc. of 2001 Second International Conference on Engineering Materials, Vol.1, pp.405-412, 2001.8
9) Deping, F., Miyagawa, T., and Yamamoto, T., “Analysis on the Flexural Behavior of Externally Prestressed Beam with Large Eccentricity by the Method of Moment-Curvature Relationship”, Materials Science Research International, JSMS, Vol.7, No.1, pp.14-18, 2001.3

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< Applied Mechanics >

Professor : Takeshi Tamura

Biography

Qualifications

B. Eng., Kyoto University, 1971
M. Eng., Kyoto University, 1973
Dr. Eng., Kyoto University, 1980

Academic Experience

Professor, Dept. of Civil and Earth Res. Eng., Kyoto Univ., 2003.3 - present
Professor, Dept. of Civil Eng., Kyoto Univ., 1996.4 - 2003.3
Associate Professor, Dept. of Civil Eng., Kyoto Univ., 1984.4 - 1996.3
Lecturer, Dept. of Civil Eng., Kyoto Univ., 1980.4 - 1984.3
Research Associate, Dept. of Transportation Eng., Kyoto Univ., 1973.4-1980.3

Professional Activities

Member of JSCE, 1971 – Present (Board Member 2001-2003)
Member of JGS, 1973 - Present
Member of JSMS, 1980 - Present (Chairman of Editorial Committee, 2001-2003)
Member of JSSC, 1994 - Present
Member of JSCES, 1996 - Present
Member of JTA, 1996 - Present

Research Interest

Current research theme is to construct a suitable mathematical model to explain the mechanical behavior in the field of infrastructure engineering. The final goal is to explain complicated mechanical behavior by a simple model. If so-called engineering know-how accumulated for years by years can be explained by a mathematical model, it can be recognized as science. Science consists of accumulated simplified models. We should not separate engineering and science.

Selected Publications

(1) Tamura, T.: Structural Mechanics –through the Principle of Virtual Work-, Asakura-Shoten, 2003. (in Japanese)
(2) Tamura, T. and Saito, J.: On the Optimal Shape of Elastic Body with Minimum Compliance, Proc. JSCE, No.738/I-64, pp.75-84, 2003. (in Japanese)
(3) Tamura, T.: Introduction to Continuum Mechanics, Asakura-Shoten, 2001. (in Japanese)
(4) Tamura, T.: On the Fundamental Mechanism of Tunneling, Keynote Lecture, Modern Tunneling Science and Technology (IS-KYOTO 2001), Vol.1, pp.9-20, 2001.
(5) Tamura, T. and Yamada, Y. : A Rigid-Plastic Analysis of Granular Materials Soils and Foundations, Vol. 36, No. 3, pp. 113-121, 1996.

(6) Tamura, T.: Linear Algebra, Kyoritsu-Shuppan, 1997. (in Japanese)
(7) Tamura, T.: Rigid-Plastic Finite Element Method in Geotechnical Engineering, Chapter 7, in “Computational Plasticity”, Elsevier, 1990.

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< Applied Mechanics >

Associate Professor : Tetsuya Sumi

Biography

Qualifications

B. Eng., Kyoto University, 1983
M. Eng., Kyoto University, 1985
Dr. Eng., Kyoto University, 1998

Academic Experience

Associate Professor, Dept. of Civil & Earth Res. Eng., Kyoto Univ., 2003.4 - Present
Associate Professor, Dept. of Civil Eng., Kyoto Univ., 1998.10 - 2003.3
Senior Research Engineer, Public Works Research Institute, MOC, 1994-1998
Visiting Research Engineer, VAW, ETH-Zurich, 1993.9-1994.2
Research Engineer, Public Works Research Institute, MOC, 1985-1993

Honors & Awards

Invited lecture, Japan-China joint seminar on water resources management, 2003
Invited lecture, The 3rd World Water Forum, Kyoto, 2003 Invited lecture, Japan Society of Dam Engineers, 2003
Best Poster Presentation Awards, Japanese Society of Hydrology and Water Resources Engineering, 1997

Professional Activities

Member of JSCE, 1983 - Present (Environmental Hydraulics Committee)
Member of IAHR, 1998 - Present
Member of JSDE, 1997 - Present
Member of JSHWR, 1995 - Present
Member of JSNDS, 2001 - Present
Member of JSECE, 2002 - Present
Member of Reservoir Sedimentation Management Committee, MLIT, 1998 - Present
Member of Dam Operation System Committee, MLIT, 2002 - Present
Member of Kuzuryu River Basin Committee, MLIT, 2001 - Present
Member of Tenryu River Comprehensive Sediment Management Committee, MLIT, 2002 - Present
Member of Arase Dam Removal Committee, Kumamoto Prefecture, 2003 – Present

Research Interest

My main research topic is 'Development of dam reservoir sedimentation management methods' which is recognized as the key issue for sustainable management of water resources toward the next generation and the integrated

management of sediment flow systems. Reservoir sedimentation management in Japan has made a remarkable progress by achievement of advanced examples in several rivers. In order to support these significant engineering topics, I'm doing several studies by using numerical simulation and field investigation methods.

Selected Publications

(1) Sumi, T. and Tsukahara, C. : Quantity Evaluation of Wash Load on Upper Dam Reservoir Basins, Proceedings of River Engineering, Vol.5, JSCE, Hydraulics Division, pp.171-176,1999. (in Japanese)
(2) Hakoishi, N. and Sumi, T.: Hydraulic design of Nakasujigawa dam stepped spillway, Int. Workshop for Hydraulics of Stepped Spillways, Zurich, 2000.
(3) Sumi, T.: Flushing Efficiency on Sediment Flushing Operation in Reservoirs, Jour. of JSDE, pp.211-221, Vol.10, No.3, 2000. (in Japanese)
(4) Sumi, T.: Future Perspective of Dam Reservoir Sediment Management, Proc. of Int. Workshop on Reservoir Sedimentation Management, Toyama, 2000.
(5) Sumi, T., Morita, S., Ochi, T. and Komiya, H.: Development of the New Suspended Sediment Concentration Measuring System With Differential Pressure Transmitter in Rivers and Reservoirs, Annual Jour. of Hydraulic Engineering, JSCE Vol.46, 2002. (in Japanese)
(6) Oya, M., Sumi, T. and Kamon. M.: Characteristics of Sediments in Reservoirs and Their Utilization, Jour. of JSDE, Vol.12, No.3, pp.174-187, 2002. (in Japanese)
(7) Sumi, T., Morita, S., Ochi, T. and Komiya, H.: Development of the suspended-sediment concentration measuring system with differential pressure transmitter in rivers and reservoirs, Proc. of Hydraulic Measurement and Experimental Methods Conference, EWRI-ASCE and IAHR, 2002.
(8) Sumi, T.: Reservoir Sedimentation Management in Japan, Proc. of the session 'Challenges to the Sedimentation Management for Reservoir Sustainability', The 3rd World Water Forum, Kyoto-Shiga-Osaka, 2003.
(9) Oya, M., Sumi, T. and Kamon. M. : Cost Analysis and Feasibility Study for PFI Project on Dam Sediment Recycling, Jour. of JSDE, Vol.13, No.2, pp.90-106, 2003. (in Japanese)
(10) Sumi, T., Takata, Y. and Okano, M.: Study on Turbidity Current Characteristics during Floods and Trap Efficiency of Fine Sediment in Reservoirs, Adv. in River Eng., JSCE, Vol.9, pp.353 – 358, 2003. (in Japanese)

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< Applied Mechanics >

Research Associate : Shunichi Kobayashi

Biography

Qualifications

B. Eng., Kyoto University, 1990
M. Eng., Kyoto University, 1992
Dr. Eng., Kyoto University, 2004

Academic Experience

Research Associate, Dept. of Civil & Earth Res. Eng., Kyoto Univ., 2003.4 - Present
Research Associate, Dept. of Civil Eng., Kyoto Univ., 1992.4 - 2003.3

Professional Activities

Member of Applied Mechanics Committee, JSCE, 1998 – Present
Member of JSCE, 1989 – Present
Member of JGE, 1990 – Present
Member of JSCES, 1996 - Present

Research Interest

I investigate a mathematical structure of rigid-plastic analysis and shakedown analysis based on the theory of continuum mechanics and nonlinear optimization. Simultaneously, I develop numerical algorithm and coding for such analyses. As an engineering application of the theoretical consideration, I investigate the numerical analysis and design methodology on the bearing capacity and stability problems in geotechnical engineering.

Selected Publications

(1) Kobayashi, S.: Development of Primal-Dual Rigid-Plastic Finite Element Method Based on The Interior Point Method, Proc. of Int. Workshop on Prediction and Simulation Methods in Geomechanics (IWS-Athens 2003), pp. 121--124, TC34 of ISSMGE, 2003.
(2) Kobayashi, S.: Development of Hybrid Rigid Plastic Finite Element Method based on Primal Dual Interior Point Method, Journal of Applied Mechanics, Vol. 6, pp. 95-106, JSCE, 2003. (in Japanese)
(3) Kobayashi, S. and Sakai, T.: Limit analysis of a stability problem of soil mass - sheet pile - anchor system, Proc. of 12th Asian Regional Conference on Soil Mechanics and Geotechnical Engineering, Singapore, pp. 797--800, 2003.
(4) Kobayashi, S., Tanaka, A. and Tamura, T.: Limit analysis of soil structures subjected to constraints by reinforcement, "Landmarks in Earth Reinforcement", Proc of IS-Kyushu 2001, Fukuoka, pp. 387-392, 2001.
(5) Kobayashi, S. and Genjo, N.: Rigid plastic shakedown analysis and its application for a bearing capacity problem of a multi-footing system, Proc of

15th ICSMGE, Istanbul, vol. 1, pp. 715-718, 2001.
(6) Kobayashi, S.: Limit analysis of sheet pile type retaining walls, Proc. of IS-Yokohama 2000, Vol. 1, pp. 315-320, 2000.

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< Environmental Hydrodynamics >

Professor : **Iehisa Nezu**

Biography

Qualifications

B. Eng., Kyoto University, 1971

M. Eng., Kyoto University, 1973

Dr. Eng., Kyoto University, 1977

Academic Experience

Professor, Dept. Civil Eng., Kyoto University, 1996.6-present

Associate Professor, Dept. Civil Eng., Kyoto University, 1981.1-1996.5

Research Fellow of Humboldt, University of Karlsruhe, 1983.2-1984.1

Assistant Professor, Dept. Civil Eng., Kyoto University, 1979.7- 1980.12

Research Associate, Dept. Civil Eng., Kyoto University, 1976.4-1979.6

Honors & Awards

*May 1976; "**Thesis Prize**" by Japan Society of Civil Engineers (JSCE)
Most authorized Prize in Japanese Civil Engineer Community.

* February 1984; **Alexander von Humboldt Award** in Germany

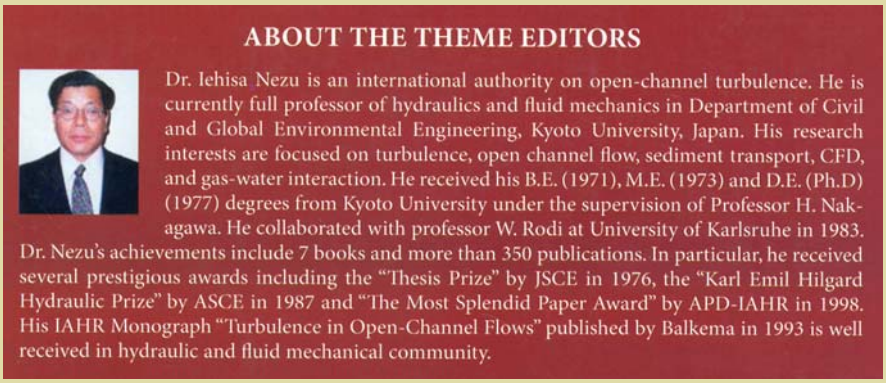
* August 1987; "**Karl Emil Hilgard Hydraulic Prize**" by ASCE

*September 1998; "**The Most Splendid Paper Award**"
(IAHR-APD Award) by IAHR

Professional Activities

Fellow of JSCE, Member of ASCE, Member of IAHR, etc.

One of examples is as follows:



ABOUT THE THEME EDITORS

Dr. Iehisa Nezu is an international authority on open-channel turbulence. He is currently full professor of hydraulics and fluid mechanics in Department of Civil and Global Environmental Engineering, Kyoto University, Japan. His research interests are focused on turbulence, open channel flow, sediment transport, CFD, and gas-water interaction. He received his B.E. (1971), M.E. (1973) and D.E. (Ph.D) (1977) degrees from Kyoto University under the supervision of Professor H. Nakagawa. He collaborated with professor W. Rodi at University of Karlsruhe in 1983. Dr. Nezu's achievements include 7 books and more than 350 publications. In particular, he received several prestigious awards including the "Thesis Prize" by JSCE in 1976, the "Karl Emil Hilgard Hydraulic Prize" by ASCE in 1987 and "The Most Splendid Paper Award" by APD-IAHR in 1998. His IAHR Monograph "Turbulence in Open-Channel Flows" published by Balkema in 1993 is well received in hydraulic and fluid mechanical community.

Editor, Proceedings of 30th IAHR Congress, Thessaloniki, Greece, 2003. Volume C-1 and C-2, (Back cover of books)

Research Interest

1. Turbulence and Coherent Structure in Open-Channel Flows with Various Boundary Conditions
2. Air-Water Interfacial Turbulent Structure and Gas Transfer
3. Turbulence Measurements and Modeling of Depth-varying Unsteady Compound Open-Channel Flows
4. Mechanism of Sediment Transport in Open-Channel Flows by LDA and PIV (Two-phase-flow Approach)
5. Coherent Vortices and Mass Transfer in Open-channel flows with Side-Cavities (Hydraulics of Groynes and River Environment)

Selected Publications in English during 2001 and 2003

1) Nezu, I. , Yoshida, K. and Ikeda, D.(2003): Experimental study on interfacial turbulent structures in wind-induced water waves by synchronous LDA measurements, Journal of Hydroscience and Hydraulic Engineering, Vol.21, No.1, pp.63-70.

2) Nezu, I. and Sanjou, M.(2003): 3-D numerical calculation of shallow free-surface flow in time-dependent stages from rectangular to compound channels, Proc. of Int. Symposium on Shallow Flows, Delft, Vol.1, pp.181-188.

3) Nezu, I., Sanjou, M. and Goto, K.(2003): Transition process of coherent vortices in depth-varying unsteady compound open-channel flows, Proc. of Int. Symposium on Shallow Flows, Delft, Vol.2, pp.215-222.

4) Nezu, I., Sanjou, M. and Sakane, Y.(2003): LDA measurements of turbulence characteristics in transition from rectangular to compound unsteady open channel flows, Proc. of 3rd Int. Symposium on Turbulence and Shear Flow Phenomena, Sendai, Vol.1, pp.449-454.

5) Nezu, I. and Sanjou, M.(2003): 3-D numerical simulation of turbulent structure in time-dependent and depth-varying unsteady compound open-channel flows, Proc. of 3rd Int. Symposium on Turbulence and Shear Flow Phenomena, Sendai, Vol.3, pp.875-880.

6) Nezu, I., Sanjou, M. and Goto, K.(2003): Coherent horizontal vortices in unsteady depth-varying compound open-channel flows, *Inland Waters (ed. I. Nezu et al.)*, 30th IAHR Congress, Thessaloniki, Greece, Vol.1, pp.57-64.

7) Nezu, I. and Yoshida, K.(2003): Fundamental study on air-water interfacial coherent structures in wind-induced water-waves flows by PIV measurements, *Inland Waters (ed. I. Nezu et al.)*, 30th IAHR Congress, Thessaloniki, Greece, Vol.1, pp.235-242.

8) Nezu, I. and Onitsuka, K.(2002): PIV measurements of side-cavity open-channel flows; Wando model in rivers, Journal of

Visualization, Vol.5, No.1, pp.77-84.

9) Nezu, I.(2002): Open-channel turbulence and its research prospect in the new century, *Advances in Hydraulics and Water Engineering(ed. J.J. Guo),* World Scientific, Vol.1, pp.3-25.

10) Nezu, I. and Onitsuka, K.(2002): Effect s of unsteadiness on velocity profiles and bed shear stress in strong unsteady open-channel flows, *Advances in Hydraulics and Water Engineering(ed. J.J. Guo),* World Scientific, Vol.1, pp.26-31.

11) Nezu, I., Ushijima, S. and Yoshida, K.(2002): Experimental study on interfacial turbulent structures in wind-induced water waves by synchronous LDA measurements, *Advances in Hydraulics and Water Engineering(ed. J.J. Guo),* World Scientific, Vol.1, pp.38-43.

12) Nezu, I., Yano, M. and Onitsuka, K.(2002): Effects of bed form on turbulent structure in an open-channel flow with side-cavities, *Advances in Hydraulics and Water Engineering(ed. J.J. Guo),* World Scientific, Vol.1, pp.44-49.

13) Nezu, I., Sanjou, M. and Sakane, Y.(2002): Three-dimensional measurements with laser Doppler anemometers in unsteady depth-varying compound open-channel flows, *Advances in Hydraulics and Water Engineering(ed. J.J. Guo),* World Scientific, Vol.1, pp.56-61.

14) Nezu, I., Azuma, R. and Onitsuka, K.(2002): Hydrodynamic characteristics of sand particles and water in open-channel flows with bed-load transport, *Advances in Hydraulics and Water Engineering(ed. J.J. Guo),* World Scientific, Vol.1, pp.199-204.

15) Nezu, I. and Sanjou, M.(2002): Numerical calculation of near-wall region in unsteady open-channel flows, *Advances in Hydraulics and Water Engineering(ed. J.J. Guo),* World Scientific, Vol.1, pp.311-316.

16) Nezu, I., Yoshida, K. and Ushijima, S.(2002): Turbulence visualization of multi-scale water velocity fluctuations of wind-driven water waves in air-water two-phase flows, 10th Int. Symp. on Flow Visualization(IAFV10), Book of Abstracts, Kyoto, p.277, (full paper on CD-Rom).

17) Nezu, I., Onitauka, K. and Azuma, R.(2002): PTV measurements of fluid and particle motions in open-channel flows by the use of spring model, 10th Int. Symp. on Flow Visualization(IAFV10), Book of Abstracts, Kyoto, p.141, (full paper on CD-Rom).

18) Nezu, I. And Onitsuka, K.(2002): LDA measurements of side-cavity open-channel flows; Wando models in rivers, Advances in Fluid Modeling & Turbulence Measurements (ed. Ninokata et al.), World

Scientific, pp.169-176.

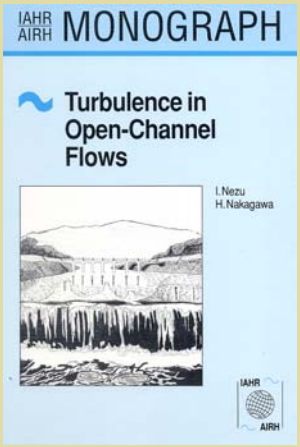
19) Nezu, I. and Onitsuka, K.(2001): Turbulent structures in partly vegetated open-channel flows with LDA and PIV measurements, Special Issue on Environmental Hydraulics, Journal of Hydraulic Research, vol.39, No.6, pp.629-642.

20) Nezu, I. and Onitsuka, K.(2001): Turbulent structures in open-channel flows with strong unsteadiness, 2nd Int. Symposium on Turbulence and Shear Flow Phenomena, Stockholm, vol.1, pp.341-346.

21) Nezu, I. and Onitsuka, K.(2001): Statistics of open-channel turbulence by using simultaneous measurements of all three components of turbulent fluctuations with two-sets of LDAs, IUTAM Symp. on Geometry and Statistics of Turbulence, K. Kambe et al.(eds.), Kluwer Academic Publishers, pp.339-344.

Publications; 8 books (in Japanese) and "*Turbulence in Open-Channel Flows*", IAHR Monograph, Balkema Publishers, Rotterdam, 1993.

Papers; more than 350 refereed papers in the International Journals such as *J. of Fluid Mech., J. of Hydraulic Eng, ASCE, J. of JSCE, J. of Hydraulic Res., IAHR,* etc.



This monograph reviews the state-of-the-art on open-channel turbulence, and treats especially certain unique features stemming from the presence of the free surface and the bed of a river. The contents are in two parts : Part 1 (Chapters 1-6) presents the statistical theory of turbulence, and Part 2 (Chapters 7-12) the coherent structures in open-channel flows and boundary layers. The book is intended for advanced students and researchers in hydraulic engineering, fluid mechanics, environmental sciences and related disciplines.

"*Turbulence in Open-Channel Flows*", IAHR Monograph, Balkema Publishers, Rotterdam, pp.1-281, 1993.

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< Environmental Hydrodynamics >

Associate Professor : **Satoru Ushijima**

Biography

Qualifications

B. Eng., Kyoto University, 1982

M. Eng., Kyoto University, 1984

Dr. Eng., Kyoto University, 1990

Academic Experience

Associate Professor, Dept. Civil & Earth Res. Eng., Kyoto Univ., 2003.4-present

Associate Professor, Dept. Global Environment Eng., Kyoto Univ., 2000.4-2003.3

Senior Researcher, Central Research Institute of Electric Power Industry, 1984.4-2000.3

Honors & Awards

Invited Speaker in Spring Conference of Korea Society of Computational Fluids Engineering, Korea, 1999.

Invited Speaker in 7th International Symposium of Flow Modeling and Turbulence Measurements (ISFMTM), Taiwan, 1998.

Professional Activities

Member of Editorial Committee for Civil Engineering, JSCE, 2002-present

Member of Applied Mechanics Committee, JSCE, 2001-present

Research Interest

Main research interests are computational fluid dynamics (CFD) and fluid measurements to understand and predict the complex fluid system, such as gas-liquid-solid multiphase flows found in hydraulics phenomena. The mathematical models and numerical procedures are newly developed for the accurate and high-speed computations. In addition, the complex fluids are experimentally studied in order to verify and improve the proposed computational methods.

Selected Publications

1) Ushijima, S., Yoshida, K., Takemura, M. and Nezu, I. "Fifth-order conservative scheme with flux control applicable to convection equations",

Journal of JSCE, No. 747, II-65 (2003) pp.121-130.
2) Ushijima, S. and Okuyama, Y. "Comparison of C-HSMAC and SOLA methods for pressure computation of incompressible fluids", Journal of JSCE, No. 747, II-65 (2003) pp. 197-202.
3) Ushijima, S., Hase, N. and Nezu, I. "Turbulence modification in vertical jets laden with slow large particles", Journal of JSME, Series B, vol. 69, No. 679 (2003) pp.124-129.
4) Ushijima, S., Takemura, M., Yamada, S. and Nezu, I. "Computational method for multiphase incompressible flows (MICS) and its applicability to particle-laden liquid flows", Journal of JSCE, No. 740, II-64 (2003) pp.121-130.
5) Ushijima, S., Takemura, M. and Nezu, I. "Investigation on computational schemes for MAC methods with collocated grid system", Journal of JSCE, No. 719, II-61 (2002) pp.11-19.
6) Ushijima, S. and Nezu, I. "Higher-order implicit method (C-ISMAC method) for incompressible flows with collocated grid system", Journal of JSCE, No. 719, II-61 (2002) pp.21-30.
7) Ushijima, S. and Nezu, I. "Computational method for free-surface flows on collocated grid with moving curvilinear coordinates", Journal of JSCE, No. 698, II-58 (2002) pp.11-19.
8) Ushijima, S. and Nezu, I. "Implicit numerical algorithm (C-ISMAC method) for free-surface flows with collocated grid system", Journal of JSME, Series B, vol. 68, No. 676 (2002) pp.24-30.
9) Ushijima, S. and Nezu, I. "Computational method for free-surface flows with 5th-order QSI scheme", Journal of JSME, Series B, vol. 68, No. 669 (2002) pp.6-12.
10) Ushijima, S., Nezu, I., Sanjou, M. and Sakane, Y. "Higher-order numerical scheme (QSI-method) on collocated grid with local quintic spline interpolation", Journal of JSCE, No. 691, II-57 (2001) pp.73-83.
11) Ushijima, S., Nezu, I., Tanaka, N. and Yoneyama, N. "Development of multiblock-parallel computation method with curvilinear coordinates and its basic features", Journal of Hydroscience and Hydraulic Engineering, Vol.19, No.1 (2001) pp.97-105.
12) Ushijima, S. "Numerical visualization of free surface oscillation predicted with arbitrary Lagrangian-Eulerian method", Journal of Visualization, Vol.3, No.3 (2000) pp.237-244.
13) Ushijima, S., Shimizu T. and Hosaka, M. "3D Numerical Prediction Method for Local Scour due to Buoyant Jets in Nearshore Field", Journal of Hydroscience and Hydraulic Engineering, Vol.17, No.1 (1999) pp.103-116.
14) Ushijima, S. "Development of High-Resolution 3D PTV Technique with Laser-Light Sheet Scannings", Journal of Hydroscience and Hydraulic

Engineering, Vol.16, No.2 (1998) pp.71-81.
15) Ushijima, S. "Three-Dimensional Arbitrary Lagrangian-Eulerian Numerical Prediction Method for Non-Linear Free Surface Oscillation", International Journal for Numerical Methods in Fluids, Vol.26, (1998) pp.605-623.
16) Ushijima, S. "Arbitrary Lagrangian-Eulerian Numerical Prediction for Local Scour Caused by Turbulent Flows", Journal of Computational Physics, 125 (1996) pp.71-82.
17) Ushijima, S. and Tanaka, N. "Three-Dimensional Particle Tracking Velocimetry with Laser-Light Sheet Scannings", Journal of Fluids Engineering (ASME), Vol.118 (1996) pp.352-357.
18) Ushijima, S. "Prediction of thermal stratification in a curved duct with 3D body-fitted coordinates", International Journal for Numerical Methods in Fluids, Vol.19 (1994) pp.647-665.
19) Ushijima, S. and Tanaka, N. "Particle tracking velocimetry using laser-beam scanning and its application to transient flows driven by a rotating disc", Journal of Fluids Engineering (ASME), Vol.116 (1994) pp.265-272.
20) Ushijima, S., Moriya, S. and Tanaka, N. "Internal Standing Waves in a Cylindrical Vessel and their Near-Wall Features", Journal of Heat Transfer (ASME), Vol.115 (1993) pp.613-620.
21) Ushijima, S., Shimizu, T., Sasaki, A. and Takizawa, Y. "Prediction method for local scour by warmed cooling-water jets", Journal of hydraulic engineering (ASCE), Vol.118, No.8 (1992) pp.1164-1183.
22) Ushijima, S., Takeda, H. and Tanaka, N. "Image processing system for velocity measurements in natural convection flows", Journal of Nuclear Engineering and Design, 132 (1992) pp.265-276.
23) Ushijima, S., Tanaka, N. and Moriya, S. "Turbulence Measurements and Calculations of Non-Isothermal Coaxial Jets", Journal of Nuclear Engineering and Design, 122 (1990) pp.85-94.

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< Environmental Hydrodynamics >

Research Associate : **Michio Sanjou**

Biography

Qualifications

B. Eng., Kyoto University, 1999

M. Eng., Kyoto University, 2001

Dr. Eng., Kyoto University, 2003

Academic Experience

Research Associate, Dept. Civil Eng., Kyoto University, 2003.4-present

Research Interest

1. 3-D Flow-visualization Measurements in Open-channel Flows by using Special PIV system
2. Experimental and Numerical Study on Turbulent Structure in Open-channel Flows including Rising Air Plumes
3. Numerical Simulation of Horizontal Vortex in Compound Open-channel Flows by using Discrete Vortex Method

Selected Publications

1) Sanjou, M. and Nezu, I. :Numerical Study on Depth-varying Time-dependent Compound Open-channel Flows, *Proc. of 30th IAHR Congress,* Thessaloniki, pp.25-32, 2003.

2) Nezu, I. ,Sanjou, M. and Goto, K.: Coherent Platform Vortices in Unsteady Depth-varying Compound Open-channel Flows, *Proc. of 30th IAHR Congress, ,* Thessaloniki, pp.57-64, 2003.

3) Nezu, I. and Sanjou, M.: 3-D Numerical Calculation of Shallow Free-surface Flow in Time-dependent Stages from Rectangular to Compound Channels, *Proc. of Int. Symp. Shallow Flows,* Delft, pp.181-188, 2003.

4) Nezu, I. ,Sanjou, M. and Goto, K.: Transition Process of Coherent Vortices in Depth-varying Unsteady Compound Open-channel Flows, *Proc. of Int. Symp. Shallow Flows,* Delft, pp.215-222, 2003.

5) Nezu, I., Sanjou, M. and Sakane, Y.: LDA Measurements of Turbulence Characteristics in Transition from Rectangular to Compound Unsteady Open-channel Flows, *Proc. of 3rd Turbulence and Shear Flow Phenomena,* Sendai, pp.449-454, 2003.

6) Nezu, I. and Sanjou, M.: 3-D Numerical Simulation of Turbulent Structure in Time-depending and Depth-Varying Unsteady Compound Open-channel Flows, *Proc. of 3rd Turbulence and Shear Flow Phenomena,* Sendai, pp.875-880, 2003.

7) Nezu, I. and Sanjou, M.: Numerical Calculation of Near-Wall Region in Unsteady Open-Channel Flows, *Advances in Hydraulics and Water Engineering (ed. John Junke Guo),* World Scientific Pub., Singapore, Vol.1, pp.136-142, 2002.

8) Nezu, I., Sanjou, M. and Sakane, Y.: Three-Dimensional Measurements with Laser Doppler Anemometers in Unsteady Depth-Varying Compound Open-Channel Flows, *Advances in Hydraulics and Water Engineering (ed. John Junke Guo),* World Scientific Pub.,Singapore, Vol.1, pp.56-61, 2002.

9) Nezu, I. and Sanjou, M.: Numerical Study on Space-Time Structure in Unsteady Turbulent Open-Channel Flows with Suspended Sediment*, Proc. of 10th International Symposium on Flow Visualization,* Kyoto, 7 pages on CD-ROM, 2002.

10) Sanjou, M.: Analysis of Unsteady Open-channel Flows by Numerical Calculation, *Proc. of 29th IAHR Congress*, Student Competition, Beijing, pp.136-142, 2001.

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< Geomechanics >

Professor : **Fusao Oka**

Biography

Qualifications

B. Eng., Kyoto University, 1972

M. Eng., Kyoto University, 1974

Dr. Eng., Kyoto University, 1978

Academic Experience

Professor, Dept. Civil & Earth Res. Eng., Kyoto Univ., 2003.4-present

Professor, Dept. Civil Eng., Kyoto Univ., 1997.10-2003.3

Professor Faculty of Eng., Gifu Univ., 1989.7-1997.9

Visiting Professor, Laval Univ. Canada, 1983.4-1984.3

Associate Professor, Faculty of Eng., Gifu Univ., 1980.11-1989.6

Lecturer, Faculty of Eng., Gifu Univ., 1979.4-1980.10

Research Assistant, Faculty of Eng., Kyoto Univ., 1977.4-1979.3

Honors & Awards

The best paper award for young researchers from the Japanese Society of Soil Mechanics and Foundation, 1974

The best paper award from the Japanese Society of Soil Mechanics and Foundation, 1986

The best paper award from the Japanese Society for Civil Engineers, 1993

Award for significant paper from International association for computer methods and advances in geomechanics, 1997

Distingushed service medal from the Japanese Geotechnical Society, 1999

Research Interest

1. Theoretical, computational and experimental studies on progressive failure and strain localization, compaction band, material instability, bifurcation, liquefaction, thermo-hydro-chemical-mechanical problem with mass transformation
2. Development of elasto-plastic, elasto-viscoplastic constitutive models for geomaterials and its application to numerical analysis
3. Large scale numerical simulation system of soil liquefaction and development of hazard map of liquefaction due to liquefaction
4. Geotechnical and environmental issues due to new energy development such as methane hydrate

Selected Publications

1) Oka, F., Kodaka, T. and Kim, Y. "A cyclic viscoelastic-viscoplastic constitutive model for clay and liquefaction analysis of multi-layered ground," Int. J. for Numerical and Analytical Methods in Geomechanics, 28 (2) (2004), 131-179.

2) Oka, F. and Kimoto, S. "An elasto-viscoplastic model for clay considering destructuralization and prediction of compaction bands," Proc. of Int. Workshop on Prediction and simulation methods in Geomechanics, Athens, Oka, F., I. Vardoulakis, A. Murakami and T. Kodaka eds., JGS (2003) 65-68.

3) Zhang, F., Yashima, A., Ozaki, H., Adachi, T. and Oka, F. "Numerical simulation of Progressive failure in cut slope of soft rock using a soil-water coupled finite element analysis," Soils and Foundations, 43 No. 5 (2003) 119-131.

4) Oka,F., Kodaka, T., Kimoto, S., Ishigaki, S. and Tsuji, C. "Step-changed strain rate effect on the stress-strain relations of clay and a constitutive modeling," Soils and Foundations, Special Issue on Deformation Characteristics of Geomaterials, 43 No.4 (2003) 189-202.

5) Oka, F., Kodaka, T., Takyu, T., Yamazaki, N. and Ohno, Y. "Deformation and strength characteristics of improved sand by a grouting materials and its application to liquefaction analysis of man made island," Proc. XIII ECSMGE, I. Vanicek et al. Eds, CGtS, Prague, Czech Republic, 1 (2003) 861-866.

6) Oka, F., Kimoto, S., Kobayashi, H. and Adachi, T. "Anisotropic behavior of soft sedimentary rock and a constitutive model," Soils and Foundations, 42 No.5 (2002), 59-70.

7) Oka, F. "A liquefaction analysis method based on finite deformation theory using a cyclic elasto-plastic model for sand," Proc. of 5th WCCM, Vienna, Austria, H. A. Mang, F. G. Rammerstorfer and J. Eberhardsteiner, (2002).

8) Oka, F., Higo, Y. and Kimoto, S., "Effect of dilatancy on the strain localization of water-saturated elasto-viscoplastic soil," Int. J. of Solids and Structures, Vol.39, Issues 13-14 (2002) 3625-3647.

9) Oka, F., Sugito, M., Yashima, A., Furumoto, Y. and Yamada, K., "Time-dependent ground motion amplification at reclaimed land after the 1995 Hyogo-Ken-Nambu Earthquake," Proc. 12th WCEE (2000), Paper No. 2046.

10) Aifantis, E. C., Oka, F., Yashima, A. and Adachi, T. "Instability of gradient dependent elasto-viscoplasticity for clay," Int. J. Numerical and Analytical Methods in Geomechanics, 23 No.10 (1999) 973-994.

11) Adachi, T., Oka, F. and Yashima, A. "A finite element analysis of strain localization for soft rock using a constitutive equation with strain softening,"

Archive of Applied Mechanics, 61 (1991) 183-191.

12) Adachi, T., Oka, F. and Poorooshasb, H.B. “A constitutive model for frozen sand,” J. of Energy Resources Technology, ASME, 112 (1990) 208-212.

13) Adachi, T., Oka, F. and Mimura, M. “Elasto-viscoplastic constitutive equations and its application to consolidation analysis,” J. of Engineering Materials and Technology, ASME, 112 (1990) 202-209.

14) Oka, F., Leroueil, S. and Tavenas, F. “A constitutive model for natural soft clay with strain softening,” Soils and Foundations, 29, No.3 (1989) 54-66.

15) Oka, F. “Constitutive equations for granular materials in cyclic loadings,” Proc IUTAM Conference on Deformation and Failure of Granular Materials, Delft, Vermeer,P.A. and Luger, H.J. eds., Balkema (1982) 297-306.

16) Adachi, T. and Oka, F. “Constitutive equations for normally consolidated clay based on elastoviscoplasticity,” Soils and Foundations, 22, No.4 (1982) 57-70.

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< Geomechanics >

Associate Professor : **Takeshi Kodaka**

Biography

Qualifications

B. Eng., Nagoya University, 1988

M. Sc., Nagoya University, 1990

Dr. Eng., Nagoya University, 1993

Academic Experience

Associate Professor, Dept. Civil & Earth Res. Eng., Kyoto Univ., 2003.4-present

Associate Professor, Dept. Civil Eng., Kyoto University, 1998.11-2003.3

Research Associate, Dept. Civil Eng., Kyoto University, 1997.11-1998.10

Research Associate, Institute of Industrial Science, University of Tokyo, 1995.4- 1998.10

Research Associate, Dept. Civil Eng., Nagoya University, 1993.4-1995.3

Honors & Awards

JSPS Research Fellow, 1992.4-1993.3

The Best Paper Award for Young Researchers from JSCE, 1994

Professional Activities

Member of the Technical Committee on Prediction of Large Strain Geomechanics, Japanese Geotechnical Society, 2001-present

Research Interest

1. Dynamic behavior of ground composed of sand, clay and improved ground by silica colloid during earthquakes
2. Rate dependent stress-strain behavior of clay
3. Modeling of 3D deformation and failure of ground through experimental and numerical study with special reference to strain localization and material instability

Selected Publications

1) Oka, F., Kodaka, T. and Kim, Y.-S. “A cyclic viscoelastic-viscoplastic constitutive model for clay and liquefaction analysis of multi-layered ground,” Int. J. for Numeriacal and Analytical Methods in Geomechanics, 28-2 (2004) 131-179..

2). Oka, F., Ohno, Y., Kodaka, T., Takyu T. and Yamasaki, N. “Deformation and strength characteristics of improved sand by a grouting materials and its application to liquefaction analysis of man made island,” Proc. 13th ECSMGE, Prague, The Czech Republic, 1 (2003) 861-866.

3) Oka, F., Kodaka, T., Kimoto, S., Ishigaki, S. and Tsuji, C. “Step-changed strain rate effect on the stress-strain relations of clay and a constitutive modeling,” Soils and Foundations, 43-4 (2003) 189-202.

4) Oka, F., Kodaka, T. and Kim, Y.-S. “Dynamic analysis of sand-clay layered ground considering a viscous effect of clay,” Proc. 12ARC, Singapore, 1 (2003) 319-322.

5) Oka, F., Kodaka, T., Morimoto, R. and Kita, N. “A Liquefaction Analysis Method Based on Finite Deformation Theory using a Cyclic Elasto-plastic Model for Sand,” Proc. of 5th World Congress on Computational Mechanics, WCCM V, Vienna, Austria, Paper-ID 81743 (2002).

6) Kodaka, T., Oka, F. and Morimoto, R. “Seepage failure analyses of sandy ground using a liquefaction analysis method based on finite deformation theory,” Proc. of 1st Asian-Pacific Congress on Computational Mechanics, APCOM 01, 1 (2001).387-392.

7) Adachi, T., Oka, F. Kodaka, T. and Takato, J.. “Deformation and Stability analysis of rectangular tunnel in soft ground using a strain softening type elasto-plastic model,” Int. Symposium on Modern Tunneling Science and technology, IS-Kyoto 2001, Kyoto, 1 (2001) 533-538.

8) Oka, F., Kodaka, T. Kim, Y.-S. “A viscoelastic-viscoplastic constitutive model for clay,” J. of Applied Mechanics, 4 (2001) 269-276.

9) Kodaka, T., Higo, Y. and Takyu, T. “Deformation and Failure Characteristics of Rectangular Clay Specimens under Three-Dimensional Condition,” Proc 15th Int. Conf. on Soil Mechanics and Geotechnical Engineering, Istanbul, 1, (2001) 167-170.

10) Kodaka, T. and Mitsunari, T. “Case Studies of Soft Clay Ground Improvement by Hard Burnt Quicklime and Sand Mixture Piles,” Proc. 11th Asian Regional Conf. on Soil Mechanics and Foundation Engineering, Seoul, Korea, 2 (2001) 829.

11) Oka, F., Kodaka, T. and Kim, Y.-S.. “A Cyclic Viscoelastic-viscoplastic Model for Clay and Its Application to Liquefaction Analysis of Ground, Proc. 10th ICCMAG, 10 IACMAG, 2 (2001) 1025 -1031.

12) Oka, F., Kodaka, T., Koizumi, T. and Sunami, S. “An Effective Stress Based Liquefaction Analysis based on Finite Deformation Theory,” Proc. 10th ICCMAG, 10 IACMAG, 2, (2001) 1113-1116.

13) Kodaka, T. and Mitsunari, T.: Consideration of Mechanism of Clay Ground Improvement by Super Quicklime Piles and Case Studies, Proc. 11th Asian Regional Conf. on Soil Mechanics and Foundation Engineering, Seoul, Korea,

1 (1999) 439-442.
14) Hayano, K., Maeshiro, T., Tatsuoka, F., Sato, T., Wang, L. and Kodaka, T. “Shear banding in a sedimentary soft mudstone subjected to plane strain compression,” Geotechnical Testing Journal, Vol.22, No.1, pp.67-79, 1999.
15) Tatsuoka, F., Jardine, R.J., Lo Presti, D., Di Benedetto, H. and Kodaka, T. “Soil Testing and Characterization of Pre-Failure Deformation Properties of Geomaterials,” Proc 14th Int. Conf. on Soil Mechanics and Foundation Engineering, Humberg, 4 (1999) 2129-2164.
16) Kohata, Y., Tatsuoka, F., Wang, L., Jiang, G., Hoque, E. and Kodaka, T. “Modeling the Non-linear Deformation Properties of Stiff Geomaterials,” Géotechnique, Vol.43, No.3, pp.563-580, 1997.
17) Kodaka, T., Asaoka, A. and Pokharel, G. “Model Tests and Theoretical Analysis of Reinforced Soil Slopes with Facing Panels,” Soils and Foundations, 35-1 (1995) 133-145.
18) Asaoka, A., Kodaka, T. and Nozu, M. “Undrained Shear Strength of Clay Improved with Sand Compaction Piles,” Soils and Foundations, 34-4 (1994) 23-32.
19) Asaoka, A., Kodaka, T. and Pokharel, G. “Stability Analysis of Reinforced Soil Structures using Rigid Plastic Finite Element Method,” Soils and Foundations, 34-1 (1994) 107-118.
20) Asaoka, A. and Kodaka, T. “Seepage Failure Experiments and Their Analyses of Loose and Medium Dense Sands,” Soils and Foundations, 32-3 (1992) 117-129.

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Research Associate : **Sayuri Kimoto**

Biography

Qualifications

B. Eng., Kyoto University, 1998

M. Eng., Kyoto University, 2000

Dr. Eng., Kyoto University, 2003

Academic Experience

Research Associate, Dept. Civil & Earth Res. Eng., Kyoto Univ., 2003.4-present

Research Interest

Characterization of geomaterials and an accurate formulation of the mechanical behavior are necessary to predict the ground deformation by numerical method. Research is focused on the description of anisotropy, degradation of soil structures, and time dependency in the constitutive model. The effect of these characteristics on the strain localization is also studied.

Selected Publications

1) Kimoto, S., Oka, F. and Higo, Y. “Strain localization analysis of elatso-viscoplastic soil considering structural degradation,” Computer Methods in Applied Mechanics and Engineering (2004), to appear.
2) Oka, F. and Kimoto, S. “An elasto-viscoplastic model for clay considering destructuralization and prediction of compaction bands,” Proc. of Int. Workshop on Prediction and simulation methods in Geomechanics, Athens, Oka, F., I. Vardoulakis, A. Murakami and T. Kodaka eds., JGS, (2003) 65-68.
3) Oka, F., Kodaka, T., Kimoto, S., Ishigaki, S. and Tsuji, C. “Step-changed strain rate effect on the stress-strain relations of clay and a constitutive modeling,” Soils and Foundations, 43 No. 4 (2003) 189-202.
4) Oka, F., Kimoto, S., Kobayashi, H. and Adachi, T. “An elasto-plastic constitutive model for soft sedimentary rock,” EM03 Electronic Proc.16th ASCE Engineering Mechanics Conference, July 16-18, 2003, University of Washington , Seattle (2003).
5) Oka, F., Higo, Y., and Kimoto, S “Effect of dilatancy on the strain localization of water-saturated elasto-viscoplastic soil,” Int. J. Solids and Structures, 39 (2002) 3625-3647.
6) Oka, F., Kimoto S., Kobayashi, H, and Adachi, T. “Anisotropic behavior of

soft sedimentary rock and a constitutive model," Soils and Foundations, 42 No. 5 (2002) 59-70.

7) Oka, F., Higo, Y. and Kimoto, S. "Instability and strain localization analysis of elasto-viscoplastic normally and overconsolidated clays," Proc. 8th Int. Symp. on Numerical Models in Geomechanics (ed. by G.N. Pande and S. Pietruszczak), 10-12 April, Rome, Italy, Balkema, (2002) 185-190.
8) Adachi, T., Kimoto, S., Oka, F. and Kobayashi, H. "A constitutive model of anisotropic behavior of soft sedimentary rock," Proc. 8th Int. Symp. on Numerical Models in Geomechanics (ed. by G.N. Pande and S. Pietruszczak), 10-12 April, Rome, Italy (2002) 75-78.
9) Adachi, T., Oka, F., Kobayashi, H., Kimoto, S., and Zhang, F. "Progressive failure of cut slope in anisotropic ground," Proc. 10th Int. Conf. Computer Methods and Advances in Geomechanics, Vol. 2 (2001) 1531-1535.
10) Oka, F., Higo, Y. and Kimoto, S. "Effect of dilatancy on strain localization of water saturated cohesive soil based on an elasto-viscoplastic model," Computational Mechanics, Proc. first Asian-Pacific Congress on Computational Mechanics (ed. by S. Valliappan and N. Khalili), 20-23 Nov., Sydney, Australia, Elsevier, 1 (2001) 1147-1154.
11) Oka, F., Higo, Y. and Kimoto, S. "Effect of dilatancy on strain localization of elasto-viscoplastic soil," Mechanical Properties of Advanced Engrg. Materials, Proc. 5th IMMM (ed. by Tokuda, M. and Xu, B.), Mie University Press (2001) 57-62.

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< Geophysics >

Professor : Yuzuru Ashida

Biography

Qualifications

B. Sc., Kyoto University, 1967

Dr. Eng., Tokyo University, 1986

Academic Experience

Professor, Dept. Civil & Earth Res. Eng., Kyoto Univ., 2003.4-present

Professor, Dept. Earth Res. Eng., Kyoto Univ., 1996.4-2003.3

Associate Professor, Dept. Earth Res. Eng., Kyoto University, 1988.4-1996.3

Lecturer, Dept. Earth Res. Eng., Kyoto University, 1986.4-1988.3

Honors & Awards

Award of the Society of Exploration Geophysics Japan, 1980

Award of the Society of Exploration Geophysics Japan, 1990

Award of the Society of Material Science Japan, 1997

Award of the Society of Exploration Geophysics Japan, 1998

Professional Activities

President of the Society of Exploration Geophysics Japan, 2001 -present

Member of the Society of Exploration Geophysics, 1968-present

Member of Science Council of Japan, 2003-present

Research Interest

I am working on the basic theory for improvement of accuracy of seismic method, signal processing using artificial neural network and interpretation of seismic data. I also apply the geophysical methods to various fields related to subsurface. My target includes

1. civil engineering such as tunnels, slopes and rivers,
2. exploration and development of new energy resources such as oil sand and methane hydrate and
3. environmental engineering such as CO2 sequestration and soil remediation treatment.

Selected Publications

1) E. Arai and Y. Ashida (2003): Two-dimensional TDEM inversion using the Localized Nonlinear Approximation, BUTSURI-TANSA, Vol.56, No.5 pp.327-337
2) R. Tada and Y. Ashida (2003): Estimation of AVO response of methane-hydrate bearing layer, BUTSURI-TANSA, Vol.56, No.4 pp.219-227
3) T. Matsuoka, H. Kusumi, Z. Wakatsuki and Y. Ashida (2003) : A Study of Elastic Waves and Hopkinson Bar Effect Using Granular Model, Journal of The Society of Materials Science Japan, Vol.52, No.5, pp.472-477
4) J. H. Lee, T. Matsuoka, Y. Ashida, H. Kanda and O. Yoshioka (2003) : Application of fresnel volume refraction tomography : Imaging of the railroad embankment, Proceedings of the 6th SEGJ International Symposium, pp.437-442
5) N. Konishi and Y. Ashida (2003): Helicopter –borne electromagnetic surveys for civil engineering and verification, Proceedings of the 6th SEGJ International Symposium, pp.405-413
6) Y. Ashida (2002): Exploration and Exploitation of Conventional and New Energy Resources in Japan, Journal of the Mining and Materials Proceeding Institute of Japan, Vol.118, No.8, pp.536-545
7) T. Matsuoka, B. T. T. Huyen and Y. Ashida (2002): Application of 3D shear-wave seismic for evaluating a superlevee, The Leading Edge, Vol.21, No.9, pp.921-922
8) Y. Ashida (2001): Seismic imaging ahead of a tunnel face with three-component geophones, International Journal of Rock Mechanics and Mining Sciences, Vol.38, pp.823-831
9) Y. Ashida (2001): Application of Geophysical Techniques to Geotechnical Engineering, International Society for Rock Mechanics News Journal, Vol.7, No.1, pp34-43
10) Y. Ashida (2001): Current geophysical activities for rock engineering in Japan, Proceedings of The 4th International Workshop on The Application of Geophysics to Rock Engineering

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< Geophysics >

Associate Professor : Tsuyoshi Sugano

Biography

Qualifications

B. Eng., Kyoto University, 1966

M. Eng., Kyoto University, 1968

Dr. Eng., Kyoto University, 1989

Academic Experience

Associate Professor, Dept. Civil & Earth Res. Eng., Kyoto Univ., 2003-present

Associate Professor, Dept. Earth Res. Eng., Kyoto University, -2003

Lecturer, Dept. Earth Res. Eng., Kyoto University, 1990-

Professional Activities

Member of the Society of Exploration Geophysics Japan

Member of the Society of Exploration Geophysics

Research Interest

My research theme includes

1. Potential analysis and modeling in resources and environmental system,
2. visualizing underground information environment and its application,
3. resources information system engineering and
4. Predictive design and monitoring of resources development.

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< Geophysics >

Research Associate : **Yoshinori Sanada**

Biography

Qualifications

B. Eng., Kyoto University, 1995

M. Eng., Kyoto University, 1997

Dr. Eng., Kyoto University, 2000

Academic Experience

Research Associate, Dept. Civil & Earth Res. Eng., Kyoto Univ., 2003.5-present

Professional Activities

Member of the Society of Exploration Geophysics Japan

Member of the Society of Exploration Geophysics

Member of the Japanese Geotechnical Society

Member of the European Association of Geoscientists & Engineering

Research Interest

My researchs are exploration geophysics, monitoring and their applications for earth resouces, civil engineering, environmental engineering, disaster prevention. My interests are numerical symulation, data processing, inversion, computer visualization for ground penetrating radar, elastic waves, geophysical logging data.

Selected Publications

1) Sanada, Y., Lin, S., Asakura, T., and Ashida, Y. (2003) : Application of Ground Penetrating Radar for Civil Engineering, The Sixteenth KKCNN Symposium on Civil Engineering, 519-524.

2) Sanada, Y., Lin, S., Matsuoka, T. and Ashida, Y., (2003) : Simulation and Inversion for Borehole Radar, NCST-Japan Joint Workshop on Rock Engineering.

3) Hirabayashi, N., Hara, K., Cao, D., Leoney, S., Borland, W., Sanada, Y., Johnston, P., (2001) : An integrated 3D tomographic inversion -application to multi-survey VSP Data-, The 5th SEGJ International symposium.

4) Hirabayashi, N., Sanada, Y., Hara, K. and Cao, D., (2001) : Tomographic Inversion of Anisotropy using VSP Data, The 5th International Symposium on Recent Advances in Exploration Geophysics in Kyoto.

5) Sanada, Y., Matsuoka, T., and Ashida, Y., (1999) : Imaging methods based on wave propagation, Buturitansa, 6, 526-538.

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< Engineering Geology >

Professor : Toshifumi Matsuoka

Biography

Qualifications

B.Sc., Tokyo Science University, 1973

M. Sc., Tokyo Science University, 1975

Dr. Eng., Tokyo University, 1995

Professional Experience

Professor, Dept. Civil & Earth Res. Eng., Kyoto Univ., 2003.4 - present

Professor, Dept. Earth Res. Eng., Kyoto Univ., 2001.11 - 2003.3

Associate Professor, Dept. Earth Res. Eng., Kyoto University, 1998.3-2001.10

Part-time instructor, Waseda University, 1997.4 – 1998. 3

Part-time instructor, Hosei University, 1995.9 – 1998.3

Manager Research Group, Japan Petroleum Exploration Co. 1988.4-1998.2

Research Associate, Japan National Oil Co., Ltd. 1986.9-1988.3

Research Geophysicist, Japan Petroleum Exploration Co. 1985.4-1986.8

Visiting Researcher, Dept. Geophysics, British Colombia University, Canada 1983.12-1985.3

Research Geophysicists, Japan Petroleum Exploration Co. 1975.4-1983.11

Honors & Awards

Key Note Address : Gas Hydrate Detection by Geophysical Methods, at Mallik International Symposium in Makuhari, 2003, Dec. 8-10, Chiba, Japan

Key Note Address : Fusion Technology in Applied Geophysics, Keynote paper, Fusion Technology in Geosystem Engineering Rock Engineering and Geophysical Exploration, 2003, Nov. 18-19, Seoul Korea

Best Paper Award : Japanese Association for Petroleum Technology, 1999

Best Paper Award : SEG Japan, 1988

Professional Activities

Board Member of SEG Japan, 2002-Present

Vice President: SEG (Society of Exploration Geophysicist), 1997-1998

Representative of District 10, SEG, 1997-1999

Chairman: 3rd SEGJ/SEG International Symposium, 1995

Vice Chairman: 2nd SEGJ/SEG International Symposium, 1992

Translation Committee Member: SEG, 1992-Present

Research Interest

In a continuous development of our society and economy, earth resources not only fossil fuel and a development underground space are indispensable. Furthermore, maintenance of earth environment is important too. My research area includes the geophysical prospecting and geoinformatics to apply investigations of structures of the earth crust and the underground. Especially the reflection seismology is one of main researches in particular data processing and visualization technology. Numerical model analysis for the geological structure formation and fluid flow phenomenon is to apply engineering problems using various geophysical and geological methods developed in oil industries.

Selected Publications

1) Matsuoka, T., Kusumi, H., Ashida, Y., and Watanabe, T. "Simulation of Hopkinson effect by discrete element method", ISRM 2003 ---Technology roadmap for rock mechanics---, (2003) 813-816.
2) Miyoshi, T., Matsuoka, T., Murata S., and Ashida Y. "3D lattice Boltzmann simulation of fluid flow in fractured rock", Groundwater Engineering – Recent Advances, Edi Kono, I., Nishigaki, M., and Komatsu, M., A.A. Balkema Publishers, Tokyo, (2003) 619-624.
3) Hirono, I., Watanabe Y., Matsuoka, T., Mito, Y., and Ohtomo, Y., "Study of groutability of fractured sedimentary rock mass", The 1st UE Kyoto, Kyoto, (2003) 391-395.
4) Hirono, I., Mito, Y., Matsuoka, T., and Noguchi, S. "Grouching effects on the mechanical properties of the rock mass of Andesite", The 1st UE Kyoto, Kyoto, (2003) 387-390
5) Ashida, Y., Matsuoka, T., and Watanabe, T. "Sesimc Imaging ahead of tunnel face with three-component geophones", The 1st UE Kyoto, Kyoto, (2003) 375-380.
6) Murakami, H., Matsuoka, T., Suzuki, K., Watanabe, T., Sugano, T., and Ashida, Y. "Resistivity monitoring for environmental remediation", The 1st UE Kyoto, Kyoto, (2003) 369-374.
7) Lee, J.H., Matsuoka, T., Ashida, Y., and Yoshioka, O., "Application of Fresnel Volume Refraction Tomography: Imaging of the Railroad Embankment"、SEGJ 6th International Symposium, (2003) 437-442.
8) Kadonoki,M., Hirano, O., Matsuoka, T., Ashida, Y., and Konishi, N., "3 Dimensional Visualization for Helicopter-borne Electromagnetic Data", SEGJ 6th International Symposium, (2003) 294-298.
9) Murata, S., Miyoshi, T., Matsuoka, T., Saito, T., and Ashida, Y., "Visualization of the Channel Flow Through a Single Fracture", EUROCK, (2002) 529-536.

10) Matsuoka, T., Wakatuki, Z., Ashida, Y., Tsukada, K., and Hanasaki, K. “Simulation of Elastic Waves and Application to Destruction Phenomena using Discrete Element Method”, JSME/ASME International Conference, (2002) 74-77.
11) Ashida, Y., Matsuoka, T., and Watanabe, T., “Seismic imaging ahead of tunnel face with three component geophones”, (2002) 72nd Ann. Internat. Mtg: Soc. of Expl. Geophys.
12) Matsuoka, T., Watanabe, T., Ashida, Y., and Murakami, H. “Air Flow Visualization and Resistivity Monitoring in Soil for Environmental Remediation”, (2002) 72nd Ann. Internat. Mtg: Soc. of Expl. Geophys,
13) Yamada, Y., Tanaka, A., and Matsuoka, T., “DEM Simulation of Continental Collision; Insights for Indentation Tectonics in Asia” , RealMod 2002 San Donato Milanese, Italy, (2002)
14) Matsuoka, T., Huyen, B.T., Ashida, Y., and Moteki, M., “Application of 3D shear-wave seismic for evaluating a superlevee”, The Leading Edge, 21 (2002) 921-922.
15) Asakawa, E., and Matsuoka, T., “Traveltime-Based Raytracing for Multiples and Converted Waves”, 64th EAGE Annual Meeting, Florence, (2002) P101
16) Matsuoka, T., Wakatuki, Z., and Ashida, Y. “Simulation of Destruction Phenomena Caused by Elastic Waves”, 64th EAGE Annual Meeting, Florence, (2002) P285
17) Mito, M., Yamamoto, S., Kodama, T., and Matsuoka, T., “Multivariate Auto-Regressive Model for Groundwater Flow Around Dam Site”, The 6th International Symposium on Recent Advanced in Exploration Geophysics (RAEG2002), Kyoto, (2002) 102-109
18) Yamada, Y., Matsuoka, T., Tamagawa. T. and Ashida, Y. “Digital Sandbox Experiments using Discrete Element Method, Proceedings of the Annual Meeting of the Tectonics Study Group”, The Geological Society, Leicester, UK, January 7, (2002)
19) Matsuoka, T., Watanabe, T., and Ashida, Y., “Induced fracture monitoring by title data”, ISRD Meeting Beijing(2001)
20) Matsuoka, T., Hasegawa, T., Yamada, Y., Tamagawa, T., and Ashida, Y. “Computer Simulation for Sandbox Experiments”, 71st Ann. Internat. Mtg: Soc. of Expl. Geophys., (2001)1187-1190.

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< Engineering Geology >

Associate Professor ; Isamu Hirano

Biography

Qualifications

B. Sc., Kyusyu University, 1976

Dr. Eng., Kyoto University, 1996

Academic Experience

Associate Professor, Dept. Civil & Earth Res. Eng., Kyoto Univ., 2003.4-present.

Associate Professor, Dept. Earth Resources Eng., Kyoto University, 1997.4.

Chief, Geology Division, Dept. Environment, Public Works Research Institute. Ministry of Construction. 1996.7.

Professional Activities

Chairman, Committee of Geology and Foundation, Japan Society of Dam Engineers, 1997- present.

Chairman, Committee of Rock Classification, Japan Society of Engineering Geology, 2002- present.

Honors & Awards

Guest Researcher, Engineering Geology Section, New Zealand Geological Survey, DSRI.

Research Interest

To construct and maintain the fundamental infrastructures for the safe and high-civilized society, improvement of the geological survey, information processing and evaluation are being conducted for the rationalization of natural disaster prevention, construction and maintenance of rock structure such as dam, tunnel and rock slope. The fundamental research including processes and mechanisms of structural formation and movement of the earth surface and rock foundation, engineering properties of soft rock, and weathering and stability of rock slope are also being conducted.

Selected Publications

1) HIRANO, I., ITO, H., TAKAHASHI, I., MIWA, M., KIBA, T., HARADA, M., “Prediction method for slaking of excavated soft rock foundation”,

Proceedings of the 33rd Symposium on Rock Mechanics, pp.289-294, 2004.
2) HIRANO, I., ITO, H., TAKAHASHI, I., MIWA, M., HARADA, M., SHIGA, J., “Restraint method for slaking of excavated soft rock foundation of claystone”, Proceedings of the 33rd Symposium on Rock Mechanics, pp.295-300, 2004.
3) HIRANO, I., ANAN, S., UEDA, S., TAKEMOTO, T., OKADA, A., “Score Rating Method for the Rock Classification of Plutonic Rocks”, Proceedings of the 2003rd Conference of the Japan Society of Engineering Geology, pp.33-40, 2003.
4) HIRANO, I., KIBA, T., SAWADA, A., “Case Study on Shore Erosion by Slabbing in Reservoir Slope of Soft Rock”, Proceedings of the 2003rd Conference of the Japan Society of Engineering Geology, pp.223-226, 2003.
5) HIRANO, I., MATSUOKA, T., KIBA, T., SAWADA, A., “FEM Analysis on Shore Erosion Model by Slabbing”, Proceedings of the 2003rd Conference of the Japan Society of Engineering Geology, pp.429-432, 2003.
6) HIRANO, I., MITO, Y., MATSUOKA, T., NOGUCHI, S., “Grouting Effects on the Mechanical Properties of the Rock Mass of Andesite”, Proceeding of the 1st Kyoto International Symposium on Underground Environment, pp.383-386, 2003.
7) HIRANO, I., WATANABE Y., MATSUOKA, T., Mito, Y., OHTOMO, Y., “Study on Groutability of Fractured Sedimentary Rock Mass”, Proceeding of the 1st Kyoto International Symposium on Underground Environment, pp.387-392, 2003.
8) HIRANO I., OKADA, A., YOSHIDA, T., “Improvement on Drawing Method of Geological Map by Geostatistics for Rock Foundation of Plutonic Rocks”, Proceedings of the 2002nd Conference of the Japan Society of Engineering Geology, pp.87-90, 2002.
9) HIRANO, I., AOKI, M., ENDO Y., MORITA, Y., KIBA T., “A Fundamental Study on Shore Erosion by Slabbing in Reservoir Slope of Soft Rock”, Proceedings of the 2002nd Conference of the Japan Society of Engineering Geology, pp.91-94, 2002.
10) Isamu HIRANO, I., YOSHIDA, T., OKADA, A., UEDA, S., “Color Measurement for the Rock Classification Index of the Rock Foundation of Plutonic Rocks”, Proceedings of the 2002nd Conference of the Japan Society of Engineering Geology, pp.281-284, 2002.
11) HIRANO, I., AOKI, M., ENDO Y., KIRITANI, R., “A Study on Rock Failure by Slabbing of Soft Rock Slope in Waterfront”, Proceedings of the 11th Japan Symposium on Rock Mechanics, I-09, 2002.
12) SADAHIRO, T., HIRANO, I., KOIKE, J., UEHARA, U., ”The Seepage Flow Analysis for the Behavior of Residual Pore Water Pressure on Dam Reservoir Limb Landslide”, Journal of Japan Society of Dam Engineering,

Vol.11, No.1, pp.5-14, 2001.
13) SADAHIRO, T., HIRANO, I., SAKAMOTO, K., KOIKE, J., “The Behavior of Residual Pore Pressure on Reservoir Limb Landslide due to Draw Down of Reservoir Level”, Journal of Japan Society of Dam Engineering, Vol.10, No.2, pp.116-127, 2000.
14) Isamu HIRANO, I., SADAHIRO, T., KOIKE, J., KIKUCHI, K., MITO, M., BABA, M., “Prediction Equations of Weathering of the Cretaceous Kitakyusyu Granite by the Freezing and Thawing Test”, Journal of the Society of Materials Science, Vol.49, No.9, pp.1050-1057, 2000.
15) KUBOTA, H., YAMAMOTO, K., HIRANO, I., MITO, Y., HONDA, M., YAMAZAKI, T., KIRITANI, R., “Improvement on the Drawing Method of the Geological Map for the Rock Foundation of the Granite by the Geostatistics”, Proceedings of the 2000th Symposium of the Japan Society of Engineering Geology, pp.337-340, 2000.
16) KUBOTA, H., YAMAMOTO, K., HIRANO, I., YAMAZAKI, T., KIRITANI, R., “Color Measurement for the Rock Classification Index of the Rock Foundation of the Granite”, Proceedings of the 2000th Symposium of the Japan Society of Engineering Geology, pp.338-344, 2000.

17) MITO, Y., WAKABAYASHI, N., HIRANO, I., KIKUCHI, K., “Laboratory Experiments on Influence of Rock Joint Properties on Joint Shear Strength Improvement by Grouting”, Journal of the Society of Materials Science, Japan, Vol.48, No.4, pp.357-364, 1999.

18) KIKUCHI, K., MITO, Y., HIRANO, I., “Grouting Effects on Deformability of Several Types of Rock Masses”, 9th International Congress on Rock Mechanics, pp.1377-1380, 1999.
19) MUTOH, K., KIKUCHI, K., MITO, Y., SUZUKI, T., HIRANO, I., “Suggestion of High Thickness -Low Pressure Grouting Method (HTLP Method) and its Verification”, Journal of Japan Society of Dam Engineers, Vol.9,No.3,pp.201-214, 1999.
20) HIRANO, I., SADAHIRO, T., KIKUCHI, K., MITO, M., NISHIBAYASHI, M., BABA, M., “Prediction Equations of Weathering of the Cretaceous Kitakyusyu Granite by Outdoor Exposure Test”, Journal of the Society of Materials Science, Japan, Vol.47, No.5, pp.508-514, 1998.
21) HIRANO, I., SADAHIRO, T., KIKUCHI, K., MITO, M., NAMIKI, H., BABA, M., “Prediction of Properties Change of the Cretaceous Granitic Rocks, Kitakyusyu Granite”, The Geotechnics of Hard Soils - Soft Rocks, Balkema, pp.537-544, 1998.
22) MUTOH, K., KIKUCHI, K., HIRANO, I., MITO, Y., “Experimental Study on Grouting Mechanism in Jointed Rock Masses using Transparent Tubes”,

Journal of Japan Society of Dam Engineers, Vol.9, No.1, pp.29-38, 1998.
23) HIRANO, I., “A proposal for the testing method of slaking properties of the soft rock”, Proceedings of the 10th Japan Symposium on Rock Mechanics, pp.43-48, 1998.
24) TAGUCHI, K., KAWAKAMI, S., HIRANO, I., NAMIKI, H., “A Model of Investigation and Stability Estimation for Landslides of Reservoir Bank”, Large dams, No.164, pp.34-49, 1997.
25) HIRANO, I., NAMIKI, H., KOIKE, J., “Geological Survey on the Excavated Rock Slope by the Infrared Remote Sensing”, Journal of Japan Society of Dam Engineers, Vol.7, No.4, pp.225-233, 1997.

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Research Associate : Yasuhiro Yamada

Biography

Qualifications

B. Sc., Tohoku University, 1987

PhD. (Geology), University of London, 1999

Professional Experience

Research Associate, Dept. Civil and Earth Res. Eng., Kyoto University, 2003.4-

Senior Researcher, JAPEX Research Centre, 1996.11-2003.3

PhD research, Geology Department, Royal Holloway College, Univ. of London, 1994.9-1996.10

Research Geologist, JAPEX Research Centre, 1990.3-1994.9

Exploration Geologist, Japan Petroleum Exploration (JAPEX) Co., Ltd. 1987.4-1990.3

Honours & Awards

Invited Presenter to 'Outstanding Presentations from around the World', American Association of Petroleum Geologists Annual General Meeting, June 2001, Denver, USA.

'Outstanding Presentation', American Association of Petroleum Geologists International Conference and Exhibition, October 2000, Bali, Indonesia.

Yamanouchi-Memorial Award, JAPEX, 1994.3

Professional Activities

Member of the Borehole Measurement Working Group, Japan Drilling Earth Science Consortium, 2003-present

Member of the New Technology Sub-Committee, Japanese Association of Petroleum Technology, 2001-present

Active member of the following professional associations;

American Association of Petroleum Geologists

American Geophysical Union

Society of Exploration Geophysicists

Geological Society of Japan

Japanese Association of Petroleum Technology

Society of Exploration Geophysicists of Japan

Society of Science on Form, Japan

Tectonics Research Group of Japan

Research Interest

Exploration of natural resources and energy needs techniques based on modern structural geology and geophysics. In particular, physical experiments and numerical simulations are useful techniques to investigate development processes of geologic structures, deep and complicated structural geometry, and modelling of subsurface fluid flow.

Selected Publications

1) Baba. K., Yamada. Y., 2004, BSRs and associated reflections as an indicator of gas hydrate and free gas accumulation: An example of accretionary prism and forearc basin system along the Nankai Trough, off central Japan. Journal of Resource Geology, in press.
2) Yamada, Y., Matsuoka, T., 2004, Digital Sandbox Modelling using Discrete Element Method (DEM): Applications to Fault Tectonics. In: Sorkhabi, R. and Tsuji, Y. (Eds.), Faults and Petroleum Traps, Amer. Assoc. Petrol. Geol. Memoir, in press.
3) Yamada, Y., Okamura, H., Tamura, Y., Tsuneyama, F., 2004, Analogue Models of Faults Associated with Salt Doming and Wrenching: Application to offshore UAE. In: Sorkhabi, R. and Tsuji, Y. (Eds.), Faults and Petroleum Traps, Amer. Assoc. Petrol. Geol. Memoir, in press.
4) Yamada, Y., McClay, K., 2004, 3D Analogue Modelling of Inversion Thrust Structures. In: McClay, K.R. (Ed.), Thrust Tectonics and Hydrocarbon Systems. Amer. Assoc. Petrol. Geol. Special Publication. in press.
5) Matsuoka, T., Huyen, B.T.T., Kusaka, N., Yamada, Y., Ashida, Y., 2003, Identification of cavities in super levee using 3D shear wave reflection seismology. Proceedings of the International Workshop on Geo-engineering in Hanoi, Vietnam.
6) Huyen, B.T.T., Yamada, Y., Matsuoka, T., 2003, Tectonics of Vietnam and its expressions on offshore seismic images. Proceedings of the NCST-Japan Joint Workshop on Rock Engineering, Hanoi, Vietnam, p. 125-129.
7) Yamada, Y., Matsuoka, T., Baba, K., 2003, Sandbox Modelling to Analyze Geometry and Development Process of Geologic Structures in Vietnam. Proceedings of the NCST-Japan Joint Workshop on Rock Engineering, Hanoi, Vietnam, p. 130-135.
8) Tanaka, A., Sanada, Y., Yamada, Y., Matsuoka, T., Ashida, Y., 2003, Computer simulation of continental collision in Asia with Discrete Element Method. Proceedings of the EIT-JAPAN-AIT Joint Workshop on Modern Technology on Computer in Rock Engineering. Bangkok, Thailand, p. 27-32.

9) Yamada, Y., Matsuoka, T., Baba, K., 2003, Sandbox Modelling: A Tool to Analyze Geometry and Development Process of Geologic Structures. Proceedings of the EIT-JAPAN-AIT Joint Workshop on Modern Technology on Computer in Rock Engineering. Bangkok, Thailand, p. 21-26.

10) Huyen, B.T.T., Yamada, Y., Matsuoka, T., 2003, Cenozoic tectonics of Southeast Asia (SE Asia) and its influence on structural styles in Vietnam. Proceedings of the International Workshop on Earth Science and Technology.

11) Yamada, Y., Tanaka, A., Matsuoka, T., 2003, DEM Simulation of Tectonic Deformation. Proceedings of the Recent Advances in Exploration Geophysics 2003, Kyoto University, Kyoto, Japan.

12) Yamada, Y., McClay, K., 2003, Application of Geometric Models to Inverted Listric Fault Systems in Sandbox Experiments. Paper-1: 2D Hangingwall Deformation and Section Restoration. Journal of Structural Geology. v.25, 1551-1560.

13) Yamada, Y., McClay, K., 2003, Application of Geometric Models to Inverted Listric Fault Systems in Sandbox Experiments. Paper-2: Insights for Possible Along Strike Migration of Material during 3D Hangingwall Deformation. Journal of Structural Geology. v.25, 1331-1336.

14) Yamada, Y. Tanaka, A., Matsuoka, T., 2002, DEM simulation of continental collision; Insights for indentation tectonics in Asia. Bollettino di Geofisica teorica ed applicata v.42, no. 1/2 supplement, 245-249.

15) Yamada, Y., Okamura, H., Tamura, Y., Tsuneyama, F. 2002. Analogue modeling of domal upwelling under tectonic stresses. Bollettino di Geofisica teorica ed applicata v.42, no. 1/2 supplement, 326-329.

16) Yamada, Y., Yamaji, A., 2002, Determination of Palaeostresses from Meso-scale Shear Fractures in Core Samples Using the Multi-inverse method. Journal of Petroleum Geology. v.25, no.2, p.203-218.

17) Yamada, Y., Tanaka, A., Matsuoka, T., 2002, DEM Simulation of Indentation Tectonics: Continental Collision of Indo-Eurasia. Proceedings of the Recent Advances in Exploration Geophysics 2002, Kyoto University, Kyoto, Japan.

18) Matsuoka, T., Yamada, Y., Tamagawa, T., Ashida, A., 2001, Computer Simulation for Sandbox Experiments. Extended Abstract, Society of Exploration Geophysicists (SEG) Annual Meeting, San Antonio, Texas, USA.

19) Yamada, Y., McClay, K. R., 2001, Sandbox Experiments of Inverted Listric Faults with Differential Displacement (Invited Paper). Extended Abstract, AAPG Annual Meeting 2001, Denver, Colorado, USA.

20) Matsuoka, T., Hasegawa, T., Yamada, Y., Ashida, A., 2001, Analogue and Digital Modelling in Structural Geology. Proceedings of the Recent Advances in Exploration Geophysics 2001, Kyoto University, Kyoto, Japan.

21) Yamada, Y., McClay, K. R., 2000, Sandbox Experiments of Inverted Listric Faults with Differential Displacement. Extended Abstract, AAPG International Meeting 2000, Bali, Indonesia.

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< Geo-Development Engineering >

Professor : **Toshiaki Saito**

Biography

Qualifications

B. Eng., Kyoto University, 1965

M. Sc., Kyoto University, 1967

Dr. Eng., Kyoto University, 1973

Academic Experience

Professor, Dept. Civil & Earth Res. Eng., Kyoto Univ., 2003.4-present

Professor, Dept. Earth Res. Eng., Kyoto Univ., 1996.11-2003.3

Associate Professor, Dept. Mineral Sci. Tech., Kyoto Univ., 1988.4-1996.10

Lecturer, Dept. Mineral Sci. Tech., Kyoto Univ., 1984.4-1988.3

Research Associate, Dept. Mineral Sci. Tech., Kyoto Univ., 1977.4-1984.3

Associate Professor, Dept. Marine Civil Eng., Tokai Univ., 1975.4-1977.3

Lecturer, Dept. Marine Civil Eng., Tokai Univ., 1973.4-1975.3

Research Associate, Dept. Civil Eng., Nagoya University, 1970.5-1973.3.

Professional Activities

Board Member of the Mining and Materials Processing Institute of Japan

Board Member of the Japanese Committee for ISRM

Board Member of Japan Institute of Aggregate Technology

Chairman of the Committee for Rock Mechanics, JSMS

Chairman of the Kansai Branch, MMIJ

Research Interest

The research focus is to develop new technologies for natural resources development and underground space utilization that can be applied to the difficult and various conditions.

Selected Publications

1) S. Murata & T. Saito “Estimation of Tortuosity of Fluid Flow Through a Single Fracture”, Journal of Canadian Petroleum Technology, Vol. 42, No. 12, pp. 39-45 (2003).

2) S. Murata, G.Nakayama and T.Saito: Effect of the contact condition of fracture on its permeability, Proc.of the First Kyoto International Symposium on Underground Environment, pp.155-161, (2003).

3) H. Sasao & T. Saito, “Measurements and analytical study for verifying the support effect of the injection type long forepiling (AGF)”, Proc.of the First Kyoto International Symposium on Underground Environment, pp.155-161, (2003).

4) Murata, S. Miyoshi, T. T. Matsuoka, T. Saito, and Y. Ashida : Visualization of the channel flow through a single fracture, Proc. of EUROCK’2002 Paper024, (2002).

5) S. Murata, H. Mitsuishi, T. Saito: Characterization of Fracture Permeability by Using a Fractal Model, Proc. of the SPE Asia Pacific Oil and Gas Conference and Exhibition, SPE77881, (2002).

6) M. Nishimura, H. Masui & T. Saito, “A New Evaluation Method on Tunnel Excavation Processes by Means of Dissipation Energy Analysis”, The 11th Japan National Symposium for Rock Mechanics, F05, January, (2002).

7) S. Ebisu, T. Asano, T. Saito, “A Simplified Design Method for the Steel Pipe Tunnel Forepiling of Injection Type”, The 11th Japan National Symposium for Rock Mechanics, F05, January, (2002).

8) S. Murata & T. Saito, “The Relation between the Contact Area of Fractures and the Amplitude of P-wave Passing through Them”, The 11th Japan National Symposium for Rock Mechanics, F05, January, (2002).

9) S. Murata & T. Saito, “Estimation of Tortuosity of Fluid Flow through a Single Fracture”, Proc. of the Canadian International Petroleum Conference, Calgary, Paper 2001-92, (2001)

10) M. Imamura, M. Chijimatsu, Y. Sugita, H. Kikuchi, S. Murata, K. Amemiya & T. Saito, “Shear Properties and Permeability of the Joint of Bentonite Buffer for Geological Disposal of High-level Radioactive Waste”, Journal of Geotechnical Engineering, No.673/III-54, pp.61-70, (2001)

11) S. Murata, K. Ogawa and T. Saito, “The change of surface properties and contact condition of rock joint according to the progress of failure”, Proc. of the '99 Japan-Korea Joint Symp. on Rock Mech., pp.343-350（1999）

12) S. Murata and T. Saito, “The variogram method for a fractal model of a rock joint surface”, Geotechnical and Geological Engineering, Vol.17 3/4, pp.197-210（1999）

13) S. Murata, T. Saito, “Variogram Method for a Fractal Model of Rock Joint Surface”, Proc. of International Conference on Geomechanics/Ground Control in Mining and Underground Construction, Vol.2, pp.1019-1028, July（1998）

14) T. Saito, S. Murata and H. Takehara, “Postfailure Lateral Deformation of Rock Specimen under the Triaxial Compression Test”, Proc. of the First Asian Rock Mechanics Symposium, Vol.1, A.A.Balkema (Rotterdam), pp.439-444（1997）

15) T. Saito and S. Murata, “Failure of rock joint surface during shear test

observed with precise surface topography measurement system”, Proc. of The Korea-Japan Joint Symp. on Rock Eng., Seoul, pp.181-186（1996）

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< Geo-Development Engineering >

Associate Professor : **Toshihiro Asakura**

Biography

Qualifications

B. Eng., Kyoto University, 1974

M. Eng., Kyoto University, 1976

Dr. Eng., Kyoto University, 1997

Academic Experience

Associate Professor, Dept. Civil & Earth Res. Eng., Kyoto Univ., 2003.4-present

Associate Professor, Dept. Earth Res. Eng., Kyoto Univ., 1999.10-2003.3

Guest Professor, Yamaguchi Univ., 1997.7-1998.3

Visiting Lecturer, Osaka Univ., 1998.4-present

Professional Activities

Member of Committee on Tunnel Engineering, JSCE, 2000-present

Member of Committee on Rock Mechanics, JSCE, 1999-present

Member of Committee on Rock Mechanics, JSMS, 1999-present

Board Member of JSRM, 2003-present

Research Interest

The research focus is to develop a technology to design, to construct and to maintain an underground rock structure such as railway or road tunnel.

Selected Publications

1) Asakura, T. “Development of tunnel data bank system” Proc. of 2nd Int. Symp. on Field Measurements in Geomechanics (1988) 927-934

2) Asakura, T., Kojima, Y., Ando, T., Sato, Y., Matsuura, A. “Fundamental study on static deformation behavior of tunnel lining” J. of JSCE No.493/3-27 (1994) 79-88

3) Asakura, T., Ando, T., Omata, F., Wakana, K., Matsuura, A., “Behavior of structurally defective tunnel lining and effectiveness of inner reinforcement” J. of JSCE No.493/3-27 (1994) 89-98

4) Asakura, T., Sato, Y., “Damage to mountain tunnels in hazard area” Special Issue of Soils and Foundations, JGS, (1996) 301-310

5) Asakura, T., Ando, T., Omata, F., Wakana, K., Saito, M., Tanaka,Y., Kawakami, Y “Reinforcement of deformed tunnel lining” Proc. of Int.

Symp. Underground Transportation Infrastructures, (1993) 373-379

6) Asakura, T., Kojima, Y., Nakata, M., Sano, N., Omata, F., Wakana, K "Countermeasure for deformed tunnel lining by inner reinforcement" Proc. of 8th Int. Symp. of ISRM (1995) 513-516

7) Asakura, T., Shiba, Y., Matsuoka, S., Oya, T., Yashiro, K. "Damage to mountain tunnels by earthquake and its mechanics" J. of JSCE No.659/3-52 (2000) 27-38

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Research Associate : **Sumihiko Murata**

Biography

Qualifications

B. Eng., Kyoto University, 1985

M. Sc., Kyoto University, 1987

Dr. Eng., Kyoto University, 2001

Academic Experience

Research Associate, Dept. Civil & Earth Res. Eng., Kyoto Univ., 2003.4-present

Research Associate, Dept. Earth Res. Eng., Kyoto University, 1996.4-2003.3

Research Associate, Dept. Mineral Sci. & Tech., Kyoto University, 1995.4-1996.3

Professional Activities

Member of the Research Committee on Rock Slope, MMIJ, 2001-present

Member of the Standardization Committee on Point Load Test, JGS, 2003-present

Research Interest

The research focus is to develop a new technology for the earth resources development, which can advance a good interface between human and nature. For this purpose, basic research on the mechanical and hydraulic properties of rock that are indispensable to such the new technology is a main theme.

Selected Publications

16) S. Murata & T. Saito "Estimation of Tortuosity of Fluid Flow Through a Single Fracture", Journal of Canadian Petroleum Technology, Vol. 42, No. 12, pp. 39-45 (2003).

17) S. Murata, G.Nakayama and T.Saito: Effect of the contact condition of fracture on its permeability, Proc.of the First Kyoto International Symposium on Underground Environment, pp.155-161, (2003).

18) T. Miyoshi, S. Murata and T. Matsuoka: Fluid flow simulation in porous media by lattice Boltzmann method, Proc.of the First Kyoto International Symposium on Underground Environment, pp. 399-404, (2003).

19) Murata, S. Miyoshi, T. T. Matsuoka, T. Saito, and Y. Ashida : Visualization of the channel flow through a single fracture, Proc. of EUROCK'2002

20) S. Murata, H. Mitsuishi, T. Saito: Characterization of Fracture Permeability by Using a Fractal Model, Proc. of the SPE Asia Pacific Oil and Gas Conference and Exhibition, SPE77881, (2002).

21) Takayuki Miyoshi, Toshifumi Matsuoka, Sumihiko Murata and Yuzuru Ashida: Fluid Flow Modeling in a single Fracture by Lattice Boltzmann Method, 2001 Fall Meeting, American Geophysical Union, San Francisco, USA, (2001).

22) S. Murata, K. Ogawa and T. Saito, "The change of surface properties and contact condition of rock joint according to the progress of failure", Proc. of the '99 Japan-Korea Joint Symp. on Rock Mech., pp.343-350（1999）

23) S. Murata and T. Saito, "The variogram method for a fractal model of a rock joint surface", Geotechnical and Geological Engineering, Vol.17 3/4, pp.197-210（1999）

24) S. Murata, T. Saito, "Variogram Method for a Fractal Model of Rock Joint Surface", Proc. of International Conference on Geomechanics/Ground Control in Mining and Underground Construction, Vol.2, pp.1019-1028, July（1998）

25) T. Saito, S. Murata and H. Takehara, "Postfailure Lateral Deformation of Rock Specimen under the Triaxial Compression Test", Proc. of the First Asian Rock Mechanics Symposium, Vol.1, A.A.Balkema (Rotterdam), pp.439-444（1997）

26) T. Saito and S. Murata, "Failure of rock joint surface during shear test observed with precise surface topography measurement system", Proc. of The Korea-Japan Joint Symp. on Rock Eng., Seoul, pp.181-186（1996）

27) S. Murata, M. Abe and K. Ogino, "The phase behavior and physical properties of microemulsion for anionic surfactant/cationic-surfactant/n-alkane/ cosurfactant/brine system", International Workshop of 13th IEA Collaborative Project on EOR, Banff Canada,（1992）

28) Y. Ueda, S. Murata, Y. Watanabe and K. Funatsu, "Investigation of shape factor used in the dual-porosity reservoir simulator", Proc. of SPE Asia-pacific Conference, Sydney, pp.35-44 (SPE19469)（1989）

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< Geo-Mechatronics >

Professor : **Koichi Hanasaki**

Biography

Qualifications

B. Eng., Kyoto University, 1963

M. Sc., Kyoto University, 1965

Dr. Eng., Kyoto University, 1972

Academic Experience

Professor, Dept. Civil & Earth Res. Eng., Kyoto Univ., 2003.4-present

Professor, Dept. Earth Res. Eng., Kyoto Univ., 1994.12-2003.3

Associate Professor, Dept. Mineral Sci. Tech., Kyoto Univ., 1985.4-1994.11

Lecturer, Dept. Mineral Sci. Tech., Kyoto Univ., 1983.4-1985.3

Visiting Researcher, Canada Centre for Mineral & Energy Tech., 1976.9-1978.8

Research Associate, Dept. Mineral Sci. Tech., Kyoto Univ., 1968.6-1983.3

Honors & Awards

The Japanese Society for Non-Destructive Inspection Award, 1987.10

Best Paper Award of the 1st Computer Information OHPC, 1982.10

Best Paper Award of the Japanese Society of Industrial Explosive, 1975.5

Professional Activities

Board Member of the Japanese Society for Non-Destructive Inspection, 1998.5-2000.4, 2003.5-present

Chairman of the Kansai Branch of the Mining and Materials Processing Institute of Japan, 2000.4-2001.3

Board Member of Mining Security Council of the Ministry of Economy, Trade and Industry of Japan, 2003.8-present

Research Interest

Structure or Mechanical equipment, built of valuable resources and energy, should safely serve as long-term as possible. Their components and material should be reutilized as much as possible. Therefore it is very important to the sustainable development of social infrastructure. To verify the safety and efficiency, the study on nondestructive testing and evaluation (NDT&E) and the relevant research are carried out.

Selected Publications

1. Z. Liu, Y. K. Ho, K.Tsukada, K.Hanasaki and L.Q. Li, "Using Multiple Orientational Filters of Steerable Pyramid for Image Registration", *Image Fusion*, pp203-214, Vol.3, No.3, 2002.
2. L.Q. Li, Z.Liu, K.Tsukada and K.Hanasaki, "Fusion of Multi-Frequency Eddy Current Signals by Using Wavelet Analysis Method", *Proc. 5th Int. Conf. on Information Fusion,* pp108-113, Annapolis, US, July, 2002.
3. Z. Liu, K. Tsukada, K. Hanasaki, Y. Ho and Y. Dai, "Image fusion by using steerable pyramid", Pattern Recognition Letters, vol.22, pp.929-939, 2001.
4. X.E. Gros, Z. Liu, K. Tsukada and K. Hanasaki, "Experimenting with Pixel-Level NDT Data Fusion Techniques", *IEEE Trans. on Instrumentation and Measurement*, Vol.49, No.5, pp.1083-1090, 2000
5. Y. Konishi, Y. Fukunaka, K. Tsukada, K. Kuribayashi and K. Hanasaki, "Anodic Dissolution Phenomena of Copper in CuSo4-H2SO4 Aqueous Solution under Microgravity Environment in Drop Shaft", *Space Forum*, vol.6, pp227-228, 2000.
6. Z. Liu, K. Tsukada, K. Hanasaki and M. Kurisu, "Two-dimensional Eddy Current Signal Enhancement via Multifrequency Data Fusion", *Research in Nondestructive Evaluation*, Vol.11, No.3, pp.161-177, 1999.
7. Z. Liu., K. Tsukada, and K. Hanasaki, "One-Dimensional eddy current multi-frequency data fusion", *Insight*, Vol.40, No.4, pp.286-289, 1998.
8. K. Hanasaki, M. Terada, N. Sakuma, E. Yoshida and K. Matsuda, "Studies on the Sensitivity of Dead Pressed Explosives in Delay Blasting", Proc. 4th FRAGBLAST, pp.395-400, 1993.
9. K. Hanasaki and K. Tsukada, "Computer Tomography of A Wire Rope by Magnetic Flux Leakage Measurement", Proc. 13th WCNDT, pp.750-754, 1992.
10. K. Hanasaki, K. Tsukada, Y. Fujinaka, T. Mitamura and K.Sugii, "A Magnetic Method to Measure Metallic Cross-Sectional Area of//Corroded Steel Wire", *Proc. 12th World Conf. on NDT, Amsterdam, The Netherlands*, Vol.2, pp.1270-1272, 1989.
11. K. Hanasaki, Y. Fujinaka, K. Tsukada, and K. Tashimo, "Estimation of Remaining Rope Strength by Electromagnetic Testing", *International Advances in Nondestructive Testing. Gordon and Breach*, Vol.15, pp.119-147, 1991.

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< Geo-Mechatronics >

Associate Professor : **Kazuhiko Tsukada**

Biography

Qualifications

B. Eng., Kyoto University, 1980

M. Eng., Kyoto University, 1982

Dr. Eng., Kyoto University, 1990

Academic Experience

Associate Professor, Dept. Civil & Earth Res. Eng., Kyoto Univ., 2003.4-present

Associate Professor, Dept. Earth Res. Eng., Kyoto Univ., 1996.4-2003.3

Lecturer, Dept. Mineral Science. & Tech., Kyoto Univ., 1994.12-1996.3

Research Associate, Dept. Mineral Sci.. & Tech., Kyoto Univ., 1985.4-1994.12

Honors & Awards

JSNDI(Japanese Soc. for Nondestructive Inspection) Research Award, 1987.10

MMIJ(Mining & Metallurgical Institute of Japan) Research Award, 1992.3

Professional Activities

Member of JSNDI, 1985 – present

(Chairman of Research Committee on MFLT, 2000.5-2002.5)

Member of MMIJ, 1980 – present

Research Interest

Development of advanced technology to improve the efficiency of large-scale mechanical facilities, construction of automatic monitoring system, and study on nondestructive testing and evaluation (NDT&E) cover the primary research field. Development of novel sensing techniques and design of the electronic circuit of measurement system are carried out, and the inverse analysis essential to the data processing is studied theoretically.

Selected Publications

1) Tsukada,K., Morita,M, Hanasaki,K., Yukutake,Y., and Yanagidani,T., “Observation of Elastic Waves in Rock Models Using Laser Doppler Vibrometer”, *Environmental Rock Engineering*, Proc. of the First Kyoto International Symposium on Underground Environment, Kyoto, Japan, pp.337-381（2003.3）

2) Matsuoka,T., Wakatsuki,Z, Ashida,Y., Tsukada,K. and Hanasaki,K., “Simulation of Elastic Waves and Application to Destruction Phenomena using Discrete Element Method”, *Proc. of JSME/ASME International Symposium on Materials and Processing 2002*, Vol.1, pp.74-77, （2002.10）
3) Moriya,T., Tsukada,K., Hanasaki,K. and Ogawa,K., “A Magnetic Method for Evaluation of the Deterioration of Wire Ropes Used for Bridges”, *Proc. of the First International Conference on Bridge Maintenance, Safety and Management*, IABMAS’02, Barcelona, Spain (CD-ROM), （2002.7）
4) X.E. Gros, Z. Liu, K. Tsukada and K. Hanasaki, “Experimenting with Pixel-Level NDT Data Fusion Techniques”, *IEEE Trans. on Instrumentation and Measurement*, Vol.49, No.5, pp.1083-1090, (2000.10)
5) Liu,Z, Tsukada,K. and Hanasaki,K., “One-Dimensional Eddy Current Multi-Frequency Data Fusion: A Multi-Resolution Analysis Approach”, *INSIGHT*, Vol.40, No.4, pp.286-289, （1998. 4）
6) Tsukada,K. and Hanasaki,K., “Application of Image Restoration Filter to Two-Dimensional Measurements of Magnetic Leakage Field Around a Surface Flaw”, *Proc. of the 1st US-Japan Symp. on Advances in NDT*, ASNT, pp.183-186, （1996.6）
7) Hanasaki,K. and Tsukada,K., “Estimation of Defects in a PWS Rope by Scanning Magentic Flux Leakage”, *NDT & E International*, Vol.28, No.1, pp.9-14, （1995. 2）
8) Tsukada,K., Hanasaki,K. and Fujinaka,Y., Magnetic Continuous Magnetic Measurement of Cross-sectional Area along Corroded Steel Wires and Wirer Ropes (in Japanese), Journal of NDT (JSNDI) , Vol.41, No.1, pp.18-25, （1992. 1）
9) Tsukada,K., Hanasaki,K. and Fujinaka,Y., “Estimation of the Size and Location of Defects in a Steel Wire Rope by Magnetic Flux Leakage Method”, *Proc. of the First Far East Nondestructive Testing Conference* (FENDT'91), Seoul, November 14-16, 1911, edited by H.Lee, S.Lee and O.Kwon, （KSNDT）pp.202-209,（1991.11）
10) Tsukada,K., Hanasaki,K. and Fujinaka,Y., “Non-Contact Acoustic Detection of Wire Breakage in Steel Wire Ropes Utilizing Inverse Magneto- strictive Effect”, *Non-destructive Testing, Proceedings of the 12th World Conference on NDT*, Amsterdam, April 23-28, 1989, edited by J.Boogaard and G.M.van Dijk, （Elsevier） Vol.2, pp.1267-1269, （1989. 4）

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Research Associate : **Li Lingqi**

Biography

Qualifications

B. Eng., Beijing Institute of Clothing Technology, China, 1989

M. Eng., Beijing University of Chemical Technology, China, 1999

Dr. Eng., Kyoto University, Japan, 2004

Professional Experience

Research Associate, Dept. Civil & Earth Res. Eng., Kyoto Univ., Japan, 2003.4 - present

Research Associate, Dept. Automatic Control Eng., Beijing Univ. of Chemical Technology, China, 1999.7 - 2000.2

Engineer, Beijing BASI Automation Co., China, 1997.1 - 1998.1

Engineer, Nanjing JINLING Petrochemical Co., China, 1993.9 – 1996.9

Professional Activities

Member of the Japanese Society for Non-Destructive Inspection, 2003.9-present

Member of the Chinese Automation Association, 1997.9-present

Research Interest

Data acquisition and signal processing techniques of nondestructive testing and evaluation (NDT&E) for construction, machine, or material, are explored as the main research field. It includes, for example, the data fusion from various sensors detecting the same target, data interpretation and characterization, and construction of automatic data processing system.

Selected Publications

1. L.Q. Li, K.Tsukada and K.Hanasaki, “A Study on Quantitative Evaluation of Eddy Current Data Based on Multiresolution Analysis Method”, *Proc. 47th JSMS Conf.*, pp233-234,Kyoto, Japan, Oct., 2003.
2. L.Q. Li, K.Tsukada and K.Hanasaki, “Studies on NDT Signal Processing Based on Multiresolution Analysis Method”, *Proc. 15th JSNDI Fall Conf.*, pp.63-66, Tokyo, Japan, Nov., 2003.
3. Y.B. Pang, H. Nishitani and L.Q. Li, “Design of Distributed System for Monitoring the Temperature and Level of Underground Water Well”, *Proc. 1st Kyoto In. Symposium on Underground Environment*, pp393-397, Kyoto,

Japan, March 2003.

4. L.Q. Li, Z. Liu, K.Tsukada and K.Hanasaki, "Fusion of Multi-Frequency Eddy Current Signals by Using Wavelet Analysis Method", *Proc. 5th Int. Conf. on Information Fusion,* pp108-113, Annapolis, US, July, 2002.
5. W. Cheng, K.Tsukada, L.Q. Li, and K.Hanasaki, "Wavelet for Ultrasonic Flaw Enhancement and Image Compression", *29th Review of Progress in QNDE*, pp601-607, Bellingham, Washington, US, July 2002.
6. Z. Liu, Y. K. Ho, K.Tsukada, K.Hanasaki and L.Q. Li, "Using Multiple Orientational Filters of Steerable Pyramid for Image Registration", *Image Fusion*, pp203-214, Vol.3, No.3, 2002.
7. L.Q. Li, K.Tsukada and K.Hanasaki, "A Novel Signal Processing Approach to Eddy Current Flaw Detection Based on Wavelet Analysis", *Proc. 14th Int. Congress on COMADEM,* pp153-160, Manchester, UK, September, 2001.
8. L.Q. Li, and Y.B. Pang, "A Study on Serial Communication between LonWorks and PC" (in Chinese), *Chinese Journal of Scientific Instrument,* pp494-496, Vol.22 No.z3, 2001.
9. Z. Liu, K. Hanasaki, L.Q. Li, and X. Y. Wei, "Review of Research on NDT (Non-Destructive Testing) Data Fusion", (in Chinese), *Journal of Measurement and Control*, pp17-19, Vol. 19, No. 8, 2000.
10. L.Q. Li, Y.B. Pang and J. Wang, "Application of SCADA in Jing-Xi Natural Gas Pipeline", (in Chinese), *Journal of Measurement and Control*, pp41-43, Vol. 18, No.1, 1999.
11. L.Q. Li, Y.B. Pang and W. Cheng, "Network Integration of Fieldbus Technique into DCS", (in Chinese), *Journal of Measurement and Control*, pp20-22, Vol. 18, No.9, 1999.
12. L.Q. Li, X.Y. Wei, Z. Liu and K.Hanasaki, "Integration of Fieldbus into DCS (Distributed Control System)", *Proc. of the 38th SICE Annual Conference*, pp1043-1046, Iwate, Japan, July, 1999.
13. L.Q. Li, W. Cheng, K.Tsukada and K.Hanasaki, "A Novel Denoising Approach Based on Multiresolution Thresholding and Its NDT Application", *to be published on the 30th Review of Progress in QNDE*, Green Bay, Wisconsin, US, August 2003.

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< Erosion and Sediment Runoff Control Engineering >

Professor : **Kazuya Inoue**

Biography

Qualifications

B. Eng., Kyoto University, 1964

M. Eng., Kyoto University, 1966

Dr. Eng., Kyoto University, 1987

Academic Experience

Professor, D.P.R.I., Kyoto Univ., 1992.6-present

Associate Professor, Dept. Civil Eng., Kyoto University, 1968-1992.5

Research Associate, Dept. Civil Eng., Kyoto University, 1966-1968

Professional Activities

Member of the committee on the Yura River Basin Management, Ministry of Land, Infrastructure and Transport, 1999-present

Member of the reviewing committee in Public Works Research Institute, Ministry of Land, Infrastructure and Transport, 2000-present

Chairperson of the committee on urban flooding, Osaka Prefecture, 2001-present

Member of the technical committee on lakes and marshes, Foundation of River and Watershed Environment Management, 1998-present

Member of the committee on underground inundation, The Japan Building Disaster Prevention associate, 2001-2002

Chairperson of the committee on urban flooding, Japan Institute of Construction Engineering, 2000

Research Interest

To prevent and decrease damages from flood disasters in urban areas, a numerical method simulating flood and sedimentation processes is being developed. Flooding experiments by means of scale models of urban areas and numerical models are also conducted, to elucidate mechanisms of flood and sedimentation in urban areas and to construct a defense system against these disasters.

Selected Publications

1) Kawaike, K., Inoue, K., Toda, K. and Nakai, T. “Effects of Sediment Yield on Inundation Flow in a Hillside City,” J. Hydroscience Hydraulic Eng., JSCE, 20(2002), 151-166.

2) Toda, K., Inoue, K., Tokunaga, T. and Kawaike, K. “Flood Hazard Analysis in River Recreation Site due to Heavy Rainfall,” Hydraulic Information Management, WIT Press, (2002), 143-152.
3) Kawaike, K., Inoue, K., Toda, K. and Sagara, R. “Inundation Analysis by Heavy Rainfall in Low-lying River Basin,” Hydraulic Information Management, WIT Press, (2002), 223-232.
4) Toda, K. and Inoue, K. “Characteristics of Recent Urban Floods in Japan and Countermeasures against Them,” Flood Defense 2002, Science Press, 2(2002), 1365-1371.
5) Toda, K., Inoue, K., Kawaike, K. and Tokunaga, T. “Flood Hazard Analysis by the Integrated River Basin Model,” Proc. 5th Taiwan-Japan Joint Seminar on Natural Hazards Mitigation, Tainan, Taiwan R.O.C., (2002), 109-117.
6) Kazama, S., Muto, Y., Nakatsuji, K. and Inoue, K. “Study on the 2000 Flood in the Lower Mekong by Field Survey and Numerical Simulation,” Proc. 13th APD-IAHR, Singapore, (2002)
7) Ishigaki, T., Inoue, K., Toda, K. and Baba, Y. “Investigation of Inundation into Underground Space in Urban Area,” The 2nd Workshop on The Development of Integrated Disaster Reduction Systems on Compound Urban Floodings, (2002), 3-19.
8) Inoue, K., Ushiyama, M., Ishigaki, T., Toda, K. and Kuriyama, K. “On Heavy Rainfall Disaster in Tokai District in September 2000,” Annuals Disas. Prev. Res. Inst., Kyoto Univ., 44B, (2001) 277-287.
9) Toda, K., Inoue, K., Kuriyama, K. and Maeda O. “Inundation Flow Analysis in Urban Areas Considering Streets and Underground Space Effects,” Proc. 29th IAHR Congress, Theme C, IAHR, (2001) 416-423.
10) Kawaike, K., Inoue, K., Toda, K. and Nakai T. “Inundation Flow Analysis Considering the Sediment Effect,” Proc. 29th IAHR Congress, Theme C, IAHR, (2001) 385-392.

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< Erosion and Sediment Runoff Control Engineering >

Associate Professor : **Masaharu Fujita**

Biography

Qualifications

B. Eng., Kyoto University, 1980

M. Eng., Kyoto University, 1982

Dr. Eng., Kyoto University, 1986

Academic ExperienceAssociate Prof., D.P.R.I., Kyoto University, 2002.7-present

Associate Professor, Grad. School of Agric., Kyoto University, 1994.10-2002.6

Associate Professor, Dept. Civil Eng., Tottori University, 1986.10-1994.10

Research Associate, Dept. Civil Eng., Kyoto University, 1985.4-1986.10

Professional Activities

Member of the reviewing committee in National Institute for Land and Infrastructure Management (Ministry of Land, Infrastructure and Transport), 2002-present

Member of the reviewing committee on physical models of sabo works (Civil Engineering Research Institute), 1999-present

JICA expert on the natural disaster mitigation program in Indonesia and Nepal (JICA), 2001-present

Member of the technical committee on the reservoir sedimentation management (Water Resources Environment Technology Center), 2002present

Research Interest

By elucidating and modeling processes of production and transport of sediment as well as riverbed changes, practical plans preventing and decreasing damages from sedimentation disasters are being drawn, and effective methods and tools controlling the sedimentation systems are being developed. Some other topics on the fluvial environment related to the sediment transport phenomena that is essential to sediment control are also studied.

Selected Publications

1) Fujita, M., Sawada, T. and Mizuyama, T. “Changes in Turbidity and Sediment Movement in a Small Mountainous Watershed”, Annual Journal of Hydraulic Engineering, JSCE, Vol.47, (2003),

739-745.
2) Fujita, M., Kinoshita, A, Sawada, T. and Mizuyama, T. “A Method for Evaluating the Influence on Fish of Sediment Flushing from Sabo dams”, Proc. of International Symposium on Disaster mitigation & Basin-Wide Water Management, (2003), 3.1B-6.
3) Kosugi, K., Mizuyama, T. and Fujita, M. “Accuracy of a Shallow-landslide Prediction Model to Estimate Groundwater Table”, Journal of Japan Society of Erosion Control Engineering, Vol.56, No.5, (2003), 21-32.
4) Fujita, M., Sawada, T. and Mizuyama, T. “Monitoring of Sediment Movement in a Small Mountain Watershed”, Interpraevent 2002 in the Pacific Rim, Congress Publication, Vol. 1, (2002), 33-40.
5) Kinoshita, A., Mizuyama, T., Fujita, M. and Sawada, T. “The Impact of Fish of Sediment Flushing from a Sabo Dam”, Interpraevent 2002 in the Pacific Rim, Congress Publication, Vol. 2 (2002), 927-934.
6) Fujita, M., Mizuyama, T. and Musashi, Y. “ Sediment Runoff Control by a Series of Sabo Dams”, Annual Journal of Hydraulic Engineering, JSCE, Vol.45, (2001), 697-703.
7) Fujita, M. and Mizuyama, T. “ A diffusion model of suspended sediment in mountain streams”, Proceedings of 12th Congress of APD-IAHR, (2000), 255-264.
8) Mizuyama,T. and Fujita, M. “ Sediment control with slit sabo dams”, INTERPRAEVENT 2000, Villach,(2000), 251-258.
9) Fujita, M., Sawada, T., Mizuyama, T. and Kinoshita A. “Movement of Sediment Removed from a Sabo Dam and its impact on River Environment”, Annual Journal of Hydraulic Engineering, JSCE, Vol.44, (2000), 1215-1221.

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< Erosion and Sediment Runoff Control Engineering >

Research Associate : Daizo Tsutsumi

Biography

Qualifications

Dr. Agric., Kyoto University, 2003

B. Agric., Shinshu University, 2000

M. Eng., Kyoto University, 1995

B. Eng., Kyoto University, 1993

Academic Experience

Research Associate, D.P.R.I., Kyoto University, 2003.10-present

COE Researcher, D.P.R.I, Kyoto University, 2003.4-2003.9

Engineer, Showa Denko Cooperation, 1995.4-1998.3

Research Interest

Preferential water flow in hillslope soils is being elucidated through field observations and laboratory experiments. A new method for analyzing the soil water flow considering the preferential flow in hillslope soils is also being developed. Throughout these studies, influences of the preferential water flow in hillslope soils on sedimentation disasters such as slope failures and following debris flows are studied.

Selected Publications

1) Tsutsumi, D., Kosugi, K. and Mizuyama, T. “Three-dimensional modeling of hydrotropism effects on plant root architecture along a hillslope,” Vadose Zone J., (in press)
2) Tsutsumi, D., Sidle, R. C., Fujita M. and Mizuyama T. “Numerical experiments to assess the influence of pipeflow on slope stability,” Annual J. Hydraulic Eng. 48 (2004) (In Japanese with English summary)
3) Tsutsumi, D., Kosugi, K. and Mizuyama, T. “A three dimensional root system development model considering hydrotropism, and its application to actual plant (*Pinus massoniana*) on a slope,” Proc. 3rd Int. Sym. Dynamics of Physiological Processes in Woody Roots, (2003)
4) Kimoto, A., Uchida, T., Mizuyama, T., Kosugi, K. and Tsutsumi, D. “Surface runoff and sediment movement on a bare slope in the Tanakami Mountains: implementation of in-situ artificial rainfall experiment,” J. Jpn. Soc. Erosion Control Eng., 55(2003) 52-58. (In Japanese with English

summary)

5) Tsutsumi, D., Kosugi, K. and Mizuyama, T. “Root system development and water extraction model considering hydrotropism,” Soil Sci. Soc. Am. J., 67 (2003) 387-401.
6) Tsutsumi, D., Kosugi, K. and Mizuyama, T. “Effect of hydrotropism on root system development in soybean (*Glycine max*): growth experiments and a model simulation” J. Plant Growth Regul., 21(2003) 441-458.
7) Tsutsumi, D., Kosugi, K. and Mizuyama, T. “Observation of 2-dimentsional root system development and soil water distribution in a root box” For. Res., Kyoto 74(2002) 99-109. (In Japanese with English summary)
8) Tsutsumi, D., Kosugi, K. and Mizuyama, T. “Root system development model assuming tropisms,” Tran. 17th World Cong. of Soil Sci., (2002)
9) Tsutsumi, D., Yamadera, Y., Miyazaki T., Kosugi, K. and Mizuyama T. “Application of root system development model assuming the tropisms for seedling in Japanese red pine (*Pinus densiflora*),” J. Jpn. Soc. Reveget. Tech., 26(2001), 309-319. (In Japanese with English summary)
10) Tsutsumi, D., Kosugi, K. and Mizuyama, T. “Root system development model including hydrotropism and gravitropism,” Proc. 6th Sym. Int. Soc. of Root Res., (2001)

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< Hydroscience and Hydraulic Engineering >

Professor : **Hajime Nakagawa**

Biography

Qualifications

B. Eng., Kyoto University, 1979

M. Sc., Kyoto University, 1981

Dr. Eng., Kyoto University, 1989

Academic Experience

Professor, Disaster Prevention Research Institute, Kyoto Univ., 2001.10-present

Associate Professor, Disaster Prevention Research Institute, Kyoto University, 1990.11-2001.9

Research Associate, Disaster Prevention Research Institute, Kyoto University, 1981.4-1990.10

Honors & Awards

Awarded a prize of Hydroscience and Hydraulic Engineering, JSCE, July, 1998

Invited Speaker at National Hydraulic Institute, Malaysia, Mar. 30-April 2, 2003, Kuala Lumpur, Malaysia

Special Lecture at Brawijaya University, Feb. 26, 2003, Malang, Indonesia

Invited Speaker at National Cheng Kung University, Jan. 16-19, 2003, Tainan, Taiwan

Invited Speaker at Chang Jung Christian University, Jan. 17, 2003, Tainan, Taiwan

Invited Speaker at the 2nd seminar on the Project of Automatic Command System for Flood Control in China, Dec.2-5, 1996, Beijin, China

Integrated Lecture at Tribhuvan University, Mar. 16-April 6, 2004, Kathmandu, Nepal

Professional Activities

Member of the Research Evaluation Committee in the field of Civil Engineering of National Institute for Land and Infrastructure Management, Ministry of Land, Infrastructure and Transport, 2001-present

Member of the Committee on Hydroscience and Hydraulic Engineering, JSCE, 2001-present

Chairman of the Editorial Committee of the “Journal of Japan Society for Natual Disaster Science”, JSNDS, 2001-present

Member of many other Committees of Local Governments and Foundations

Research Interest

Sediment yield and Debris flow disaster

Overland flood flow disaster

Driftwood behavior

River restoration and disaster mitigation/prevention

Selected Publications

1) Nakagawa, H., Takahashi, T., Satofuka, Y. and Kawaike, K. "Numerical simulation of sediment disasters caused by heavy rainfall in the Camuri Grande basin, Venezuela 1999", Proc. of the 3rd International Conf. on Debris-flow Hazards Mitigation: Mechanics, Prediction, and Assessment, Davos, Switzerland, (2003), pp.671-682.
2) Nakagawa, H., Toda, K., Ushiyama, M., Muto, Y. and Todoko, F. "Characteristics of Heavy Rainfalls and Sediment Disasters in Taiwan, July 2001", Annual Journal of Hydraulic Engineering, JSCE, Vol.47 (2003), pp.595-600.
3) Nakagawa, H. "Hydro-related disasters at estuaries -Approach from the disaster prevention against storm surges and tsunamis", River, No.680 (2003), pp.9-14.
4) Nakagawa, H. "Analysys of driftwood behavior debouched into a bay by using Eulerian and Lagrangian coupling model", Proc. of 2nd International Symposium on Flood Defence, (2002), pp.1649-1657.
5) Takahashi, T., Nakagawa, H., Satofuka, Y. and Wang, H.M. "Debris flow control by a grid-type Sabo dam", Proc. of 2nd International Symposium on Flood Defence, (2002), pp.1629-1636.
6) Nakagawa, H., Takahashi, T., Satofuka, Y. and Kawaike, K. "Estimation of Efficacy of Sabo Facilities by Means of Numerical Simulation Method", Proc. of 5th Taiwan-Japan Joint Seminar on Natural Hazards Mitigation, (2002), pp.43-63.
7) Nakagawa, H., Sumi, T., Miyoshi, I., Takahama, J., Satofuka, Y. and Yokomori, M. "Field observation on the sediment yield and runoff in the Mibu River basin", Proc. of Advances in River Engineering, Vol.8 (2002), pp.91-96.
8) Nakagawa, H., Takahashi, T. and Satofuka, Y. "An Analysis of the Debris Flow Disaster in the Harihara River Basin", Spec, Publs, Int. Ass. Sediment., Vol.31 (2001), pp.45-64.
9) Nakagawa, H. and Takahashi, T. "Behavior of Driftwood Debouched from the Ohno River into the Bay of Beppu during the 1990 Flood", Annual Journal of Hydraulic Engineering, JSCE, Vol.45 (2001), pp.931-936.

10) Nakagawa, H., Takahashi, T., Sawada, T. and Ishibashi, A. “Simulation of Evacuation Action of Residents Using GIS -Application to the Sediment Hazard prone Area”, Proc. of the 4th International Conference, Hydroinformatics (2000), Iowa USA, CD-ROM Version (GIS-2).

11) Nakagawa, H., Toda, Keiichi., Satofuka, Y., Nagao, M., Sakanoi, K., Hatakeyama, S., Takagi, S. and Hirakawa, R. “To Utilize the Experience of the Katherine Typhoon Disaster -The Risk Management Method of Tone River”, Proc. of the River Engineering, (2000), pp.279-284.

12) Nakagawa, H. “Flooding of River Water”, Jour. of Japan Society of Fluid Mechanics, Vol.19 (2000), pp.88-95.

13) Nakagawa, H., Takahashi, T. Satofuka, Y. and Tatsumi, M. “Effects of Bedrock Shape on a Landslide under the Seismic Force”, Jour. of the Japan Society of Erosion Control Engineering, Vol.52, No.5 (2000), pp.4-15.

14) Nakagawa, H., Takahashi, T. and Satofuka, Y. “Channel Variation of the Yosasa River Tributary of the Naka River due to 1998 Flood”, Annual Journal of Hydraulic Engineering, JSCE, Vol.44 (2000), pp.395-400.

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Associate Professor : **Taisuke Ishigaki**

Biography

Qualifications

B. Eng., Kyoto University, 1975

M. Eng., Kyoto University, 1977

Dr. Eng., Kyoto University, 1993

Academic Experience

Associate Professor, DPRI., Kyoto University, 1995.1–present

Academic Visitor, Dept. of Civil & Building Eng., Loughborough Univ.ersity, 2000.5-7

Guest Researcher, Institute for Hydrology and Water Resources, University Karlsruhe, 1987.3-1987.12

Research Associate, DPRI, Kyoto University, 1981.4 – 1994.12

Honors & Awards

Award by the Seventh Congress of APD-IAHR, 1990.11

Travel award of Kyoto University (Germany), 1987.3-12

Travel award of Ministry of Education (United Kingdom), 2000.5-7

Professional Activities

Member of Hydraulic Instrumentation Section of International Association of Hydraulic Engineering and Research, 2003.8-present

Research Interest

Flood disaster

Compound channel flow

Local flow and scouring

Selected Publications

1) Ishigaki, T., Toda K. and Inoue, K.: Hydraulic Model Tests of Inundation in Urban Area with Underground Space, Proc. of 30th Congress of IAHR, Thessaloniki, Greece, Theme B, pp.487-493, 2003.

2) Ishigaki, T. and Endo A.: Characteristics of Flow and Bed Form in Skewed Open Channel, Int. Symp. on Shallow Flows, Delft, Pert II, pp.35-40, 2003.

3) Ishigaki, T. and Baba, Y.: Local Scour by Secondary Flow around

Constriction in Open Channel, Proc. of 13th Congress of APD-IAHR, Singapore, Vol. I, pp.261-265, World Scientific Publishing, 2002.
4) Ishigaki, T. and Funahashi, R.: Complex Flow Through Constriction Scoured by Oscillatory Open Channel Flow, Proc. of 8th International Symposium on Flow Modeling and Turbulence Measurements, Ed. Ninokata etc., pp.119-126, World Scientific Publishing, 2002.
5) Ishigaki, T., Shiono, K. and Rameshwaran, P.: PIV and LDA Measurements of Secondary Flow in a Meandering Channel for Overbank Flow, Journal of Visualization, Vol.5, No.2, pp.153-159, 2002.
6) Ishigaki, T. and Muto, Y.: Secondary Flow and Bed Form in Compound Sinuous Channel for Steady and Unsteady Flows, Proc. of 29th IAHR Congress, Beiling, Theme D, Vol.I, pp.143-149, 2001.
7) Ishigaki, T., Baba, Y. and Muto, Y.: Vortex motion around a plate with footing in open channel flow and its effect on local scouring, Proc. of 4th Int. Conf. on Hydro-Science and –Engineering, Vol. IV, p.169, 2000.
8) Ishigaki, T. and Muto, Y.: Flow structure and bed form in compound sinuous channel, Proc. of 12th Congress of APD-IAHR, Vol.I, pp.211-217, 2000.
9) Ishigaki, T., Muto, Y., Takeo, N. and Imamoto, H. : Fluid Mixing and Boundary Shear Stress in Compound Meandering Channel, Proc. 27th IAHR, San Francisco, A, pp.763-768, 1997.
10) Ishigaki, T., Imamoto, H. and Muto, Y.: Secondary Flow and Side-wall Turbulence in Open Channel Flow, Proc. of 10th Congress of APD-IAHR, Vol.2, pp.141-147, 1996.
11) Ishigaki, T., Imamoto, H. and Shiono, K.: Coherent structure near the side-wall in open channel flow, Proc. of 26th Congress of IAHR, Vol.1, pp.182-187. 1995.
12) Imamoto, H. and Ishigaki, T.: Flow visualization in a transverse cross section of an open channel flow, Experimental Thermal and Fluid Science, Vol. 5, No.3, pp.268-273, 1992.
13) Imamoto, H. and Ishigaki, T. : Visualization of secondary flow in a compound open channel, Proc. of 7th Congress of APD-IAHR, Vol.III, pp.485-490, 1990. (APD-IAHR Award)

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Research Associate : Tetsuo Ueno

Biography

Qualifications

B. Eng., Kyoto University, 1967

M. Eng., Kyoto University, 1969

Dr. Eng., Kyoto University

Academic Experience

1969-Present: Research Associate, Kyoto University

Research Interest

Observation of flood flow

Inundation

Turbulence in river

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Research Associate : Yasunori Muto

Biography

Qualifications

B.Eng., Kyoto University, 1989

M.Eng., Kyoto University, 1992

Ph.D., Bradford University, 1997

Academic Experience

1994-Present: Research Associate, Kyoto University

1992-1994: Research Assistant, Bradford University

Honors & Awards

Academic Award, Japan Society for Natural Disaster Science, 2002

Professional Activities

Member, The Yodo River Environment Committee

Research Interest

Local flow subject to hydraulic structures or complex geometriesTurbulent flow and turbulence related to internal friction, sediment movement and bed deformation.

Selected Publications

J. Fluid Mechanics, Vol.376, pp. 221-261, 1998.

J. Hydraulic Research, IAHR, Vol.37, No.5, pp.641-664, 1999.

J. Japan Society for Natural Disaster Science, Vol. 19, No.2, pp.257-271, 2000.

Advances in River Engineering, Vol.8, pp.383-388, 2002.

Advances in River Engineering, Vol.9, pp.197-200, 2003.

J. Hydroscience and Hydraulic Engineering, Vol.23, No.1, 2004.

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Research Associate : **Yasuyuki Baba**

Biography

Qualifications

B. Eng., Kyoto University, 1991

M. Eng., Kyoto University, 1993

Dr. Eng., Kyoto University, 2001

Academic Experience

Research Associate, DPRI., Kyoto University, 1996.4-present

Visiting Scientist, Dept. Water Resource Eng., Lund University, 2002.10-2003.9

Research Interest

Coastal and nearshore currents

Tidal currents in bays

Selected Publications

1) Baba, Y., Yamashita, T. and Kato, S.: Sea Surface Stress's Relation to Whitecap Dissipation in the Shoaling Zone, Proc. Int'l Conf. on Coastal Engineering (ICCE2002), Vol.1, pp.247-257, 2002.7.

2) Baba, Y., Yamashita, T., Abbas, Y. and Gobuichi, T.: Empirical Formulation of Coastal Currents and Sediment Transport Rate under Storm Condition, PACON2002.

3) Baba, Y., Yamashita, T. and Kato, S.: Experiment for wind-wave energy dissipation and its induced current on the sloping bottom, Proc. of Coastal Engineering, JSCE, Vol.48, pp.446-450, 2001.

4) Baba, Y., Imamoto, H., Yamashita, T. and Kato, S.: Wind-driven currents in shallow water and its wind response --Analyses of ADCP data at Hazaki Oceanographical Research Station, 1999--, Proc. of Coastal Engineering, JSCE, Vol.47, pp.446-450, 2000.

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Professor : **Susumu Iai**

Biography

Qualifications

University of Tokyo, Doctor of Engineering, 1991

University of British Columbia, Canada, Visiting Researcher, 1980-1982

University of Tokyo, B.S., Civil Engineering, 1974

Academic Experience

2002-present: Professor, Disaster Prevention Research Institute, Kyoto University

2001-2002: Director for Special Research (Disaster Prevention) Port and Airport Research Institute

1998- 2001: Chief, Earthquake Disaster Prevention Laboratory, Port and Harbour Research Institute, Ministry of Transport

1989- 1998 Chief, Geotechnical Earthquake Engineering Laboratory, Port and Harbour Research Institute, Ministry of Transport

1974- 1989: Earthquake Resistant Structures Laboratory, Port and Harbour Research Institute, Ministry of Transport

Honors & Awards

1998 Best Paper Award, awarded by the Japanese Geotechnical Society

1996 Award for outstanding research accomplishment, awarded by the Minister of Science and Technology Agency, Japanese Government

1994 Prakash Award for significant contributions to geotechnical earthquake engineering, awarded by the Shamsher Prakash Foundation, U.S.A.

1994 Award for outstanding research accomplishment, awarded by the Japanese Society of Soil Mechanics and Foundation Engineering

Professional Activities

2002-present Convener of ISO/TC98/SC3/WG10 Seismic actions on geotechnical works

1997 Convener of Japan - U.S. Workshop on Acceptable Seismic Risk for Port Facilities, Yokosuka, Japan

1996 - 2001 Chairman of Working Group No.34: Effects of Earthquakes on Port Structures, International Association of Navigation (PIANC)

1996 Convener of International Workshop on Site Response subjected to

Strong Earthquake Motions, Yokosuka, Japan

1995 - present Standing member of Asian Technical Committee on Zonation of Geotechnical Hazards, Asian Society of Soil Mechanics and Foundation Engineering

1994 Member of judging committee of liquefaction resistant bridge design competition, the Institution of Civil Engineers, U.K.

1994 - present Standing member of the International Standard Organization (ISO) TC67/SC7/WG3/Panel 5 for earthquake resistant design of offshore structures

1993 – 1997 Joint project with Waterways Experiment Station, U.S. Army Corps of Engineers, for publication of English edition of "Handbook on Liquefaction Remediation of Reclaimed Land," originally published in Japanese

1993 Convener of International Workshop on Strong Motion Data, Menlo Park, Ca. U.S.A.

Research Interest

The core of the research activities is the study on soil-structure interaction associated highly non-linear behavior, including soil liquefaction during earthquakes. The res activities are directed towards establishing the mechanics of geo-hazards and achi higher seismic performance of infra-structures, and extend over a wide range, incl seismic damage reconnaissance, numerical analysis of non-linear problems, centrifuge model testing.

Selected Publications

1) Iai, S. (1989) : "Similitude for shaking table tests on soil-structure-fluid model in 1g gravitational field," Soils and Foundations, Vol.29, No.1, pp.105-118

2) Iai, S., Tsuchida, H. and Koizumi, K. (1989) : "A liquefaction criterion based on field performances around seismograph stations," Soils and Foundations, Vol.29, No.2, pp.52-68

3) Iai, S., Matsunaga, Y. and Kameoka, T. (1992a) : "Strain space plasticity model for cyclic mobility," Soils and Foundations, Vol.32, No.2, pp.1-15

4) Iai, S., Matsunaga, Y. and Kameoka, T. (1992b) : "Analysis of undrained cyclic behavior of sand under anisotropic consolidation," Soils and Foundations, Vol.32, No.2, pp.16-20

5) Iai, S. and Kameoka, T. (1993) : "Finite element analysis of earthquake induced damage to anchored sheet pile quay walls," Soils and Foundations, Vol.33, No.1, pp.71-91

6) Iai, S. (1993a) : "Micromechanical background to a strain space multiple mechanism model for sand," Soils and Foundations, Vol.33, No.1, pp.102-117

7) Iai, S. (1993b) : "Three dimensional formulation and objectivity of a strain space multiple mechanism model for sand," Soils and Foundations, Vol.33, No.1, pp.192-199

8) Iai, S. (1993c) : "Concept of effective strain in constitutive modeling of granular materials," Soils and Foundations, Vol.33, No.2, pp.171-180

9) Iai. S. (1994) : "A new look at the stress dilatancy relation in Cam-Clay

model," Soils and Foundations, Vol.34, No.2, pp.1-12

10) Iai, S., Morita, T., Kameoka, T., Matsunaga, Y., and Abiko, K. (1995) : "Response of a dense sand deposit during 1993 Kushiro-Oki earthquake," Soils and Foundations, Vol.35, No.1, pp.115-131

11) Inagaki, H., Iai, S., Sugano, T., Yamazaki, H., and Inatomi, T. (1996) : "Performance of caisson type quay walls at Kobe port," Special Issue on Geotechnical Aspects of the January 17 1995 Hyogoken-Nambu Earthquake, Soils and Foundations, pp.119-136

(12) Iai, S., Ichii, K., Liu, H., and Morita, T. (1998): "Effective stress analyses of port structures," Special Issue on Geotechnical Aspects of the January 17 1995 Hyogoken-Nambu Earthquake, No.2, Soils and Foundations, pp.97-114

12) Iai, S. (1998): "Seismic analysis and performance of retaining structures, State-of-the-art, Geotechnical Earthquake Engineering and Soil Dynamics III, Geotechnical Special Publication No.75, ASCE, pp.1020-1044

13) Iai, S. and Sugano, T. (1999): "Soil-structure interaction studies through shaking table tests," Theme lecture, Proc. 2nd International Conference on Earthquake Geotechnical Engineering, Balkema, pp.927-940

14) Iai, S. (2001): "Recent studies on seismic analysis and design of retaining structures," State-of-the-art, Proc. 4th International Conference on Recent Advances in Geotechnical Earthquake Engineering and Soil dynamics, CD-ROM, Paper SOAP-4, pp.1-28

15) Iai, S. and Bardet, J.P. (2001): "Plane strain instability of saturated elasto-plastic soils," Geotechnique, Vol.51, No.5, pp.389-398

16) Bardet, J.P. and Iai, S. (2002): "Axisymmetric instability of fluid saturated previous cylinders," Journal of Applied Mechanics, Vol.69, No.6, pp.717-723

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Associate Professor : **Mamoru Mimura**

Biography

Qualifications

Dr. Eng. (Geotechnical Engineering) Kyoto University 1991

M. A. Sc. (Geotechnical Engineering) Kyoto University 1983

B. Sc. (Civil Engineering) Kyoto University 1981

Academic Experience

1993 - present Associate professor, Disaster Prevention Research Institute, Kyoto University

1983 - 1993 Research Associate, Disaster Prevention Research Institute, Kyoto University

1981 - 1983 Graduate Studies, Kyoto University

Honors & Awards

Young Researcher's Awards, JSSMFE, 1991

Visiting Fellow at Deft Geotechnics, the Netherlands, 1993.

Merit Paper Awards, 5th Int. Conf. Field Measurement in Geomechanics, December 1-3, 1999.

Special lecture at National University of Singapore, March 9, 1998.

Invited Speaker, Int. Conf. on Coastal Engineering in Practice, May 21-23, 2002.

Invited Speaker, Int. Conf. on Advances in Soft Soil Engineering and Technology, July 2-4, 2003.

Special Lecture at Hokkaido University, Japan, July 23, 2003.

Professional Activities

Member of Asian Technical Committee on Land Reclamation and Coastal Structures in Asia, JGS, 2002 –present

Member of Asian Technical Committee on Urban Geo-informatics, JGS, 2002-present

Member of Research Committee on Ground in Osaka Bay, Association of Research on Geotechnical Information in Osaka Bay, 1999 – 2003.

Member of Research Committee on Geotechnical Disaster, Association of Research on Underground Water, 1997-2003.

Member of Geo-database Information Committee of Kansai, Association of

Research on Geotechnical Information in Kansai, 1997 – 2002.

Research Interest

Rational geotechnical modeling has been developed to assess the deformation stability of the soft deposits that are situating along metropolitan bay area. The proc in terms of the elasto-viscoplastic finite element analysis has been proposed to eva the time-dependent behavior of quasi-overconsolidated clay deposits. In addition, "geo-informatics" based on the accumulated borehole information has also been deve to evaluate the fragility of urban geotechnical foundations.

Selected Publications

1) Mimura, M., Takeda, K., Yamamoto, K., Fujiwara T. and Jang, W. "Long-term Settlement of the Reclaimed Quasi-overconsolidated Pleistocene Clay Deposits in Osaka Bay", Soils and Foundations, Vol. 43, No. 6, (2003) 141-153.

2) Mimura, M. "Assessment for Liquefaction Potential of Kyoto Basin on the Basis of Geo-database" Jour. Of Janan Society for Natl. Disas. Science, Vol.22, No.3, (2003) 241-244 (in Japanese).

3) Kanatani, M., Kiku, H., Yasuda, S., Yoshida, N., Ishihara, K., Kokusho, T., Mimura, M., Goto Y. and Morimoto, I. "Damage on Waterfront Ground During the 1999 Kocaeli Earthquake in Turkey", Soils and Foundations, Vol. 43, No. 5, (2003) 29-40.

4) Mimura, M., Jang, W., Takeda, K., Yamamoto K. and Fujiwara T. "Evaluation of Time-dependent Compression of the Structural Osaka Bay Pleistocene Clays", Proc. of the Sino-Japanese Symposium on Geotechnical Engineering in Urban Construction, (2003) 154-161.

5) Mimura M. and Jang W. " Long-term Settlement of Reclaimed Marine Structural Pleistocene Clay Deposits", Proc. 2nd Int. Conf. 0n Advances in Soft Soil Engineering and Technology, (2003) 335-351.

6) Mimura M. and Jang W. "Description of Time-dependent Behavior of the Aged Stiff Clays", Proc. of Korea Japan Joint Workshop, Characterization of Thick Clay Deposits, Reclamation and Port Construction, (2003) 239-248.

7) Mimura, M. "Characteristics of Some Japanese Natural Sands - Data from Undisturbed Frozen Samples-", Proc. Int. Workshop on Characterization and Properties of Natural Soils, Vol. 2, (2002) 1149-1168.

8) M. Mimura and K. Yamamoto "Development of Urban Geo-Database in Kansai and Assessment of Liquefaction Potential", Geotechnical Investigation in the Information Era, Proc. of the 2nd IKRAM Int. Geotech. Conf., (2002) 235-252.

9) Mimura, M., Noda, T., Yamada, E., Takaine, T., Kodaka T. and Shimazu, T. "Design Theory and Practice of Shallow Foundation, Piled Raft Foundation", Tsuci-to-Kiso, JGS, Vol. 50, No.8, (2002) 15-17 in Japanese).

10) Mimura, M., Oda, K., Takeda, K., Yamamoto, K. and Fujiwara, T. "Compression Properties and Settlement Behavior of Pleistocene Clay Deposits Due to Reclamation in Osaka Bay", Proc. 46th JGS Symposium,

(2001) 99-102 (in Japansese).

11) Matsui, T., Mimura, M., Oda, K., Takeda, K., Suwa, S and Yamamoto, K. “Settlement Behavior of Pleistocene Marine Clay Deposits due to reclamation in Osaka Bay”, Proc. 3rd Int. Conf. on Soft Soil Engineering, (2001) 429-434.

12) Mimura, M. and Suzaki, T. “Liquefaction Assessment for Natural Sandy Deposits with Cone Tests”, Proc. Int. Conf. On In-situ Measurement of Soil Properties and Case Histories, (2001) 455-460.

13) Mimura, M. Shrivastava, A. K., Shibata, T. and Nobuyama, M. “Evaluation of In-situ Natural Water Content and Wet Density with RI-Cone Penetrometer for Sandy Deposits”, Journal of JSCE, 638/III-49, (1999), 227-240 (in Japanese).

14) Mimura, M. Shrivastava, A. K., Shibata, T. and Nobuyama, M. “In Situ Measurement of Wet Density and Natural Water Content with RI-Cone Penetrometers”, Proc. 5 th Int. Symp. on Field Measurements in Geomechanics, (1999) 559-564.

15) Mimura, M and Suzaki, T. “Assessment of Liquefaction Resistance for Sandy Deposit with CPT”, Tsuchi-to Kiso, JGS, Vol. 47, No.9, (1999) 21-23 (in Japanese).

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Research Associate : **Tetsuo Tobita**

Biography

Qualifications

Ph. D (Civil Engineering), University of Southern California, USA, 2002

M. Sc., Kyoto University, 1997

B. Eng., Kyoto University, 1995

Academic Experience

2002-present: Research Associate, Disaster Prevention Research Institute, Kyoto University

1997-2002: Research Assistantship, Department of Civil and Environmental Engineering, University of Southern California

1997-2000: Teaching Assistantship, Department of Civil and Environmental Engineering, University of Southern California

Honors & Awards

Outstanding Teaching Assistant Award, University of Southern California, 2000

Outstanding Teaching Assistant Award, University of Southern California, 1998

Outstanding student speaker, JSCE Kansai Chapter,1995

Professional Activities

2004 Member of Reconnaissance team after the 2003 Bam, Iran, Earthquake (JSCE)

Research Interest

Main research interest is the soil dynamics. Currently, I am engaged in experimenta analytical studies of soil-structure interaction. My research objective is to mi geo-disaster through learning the pattern and understanding the mechanics of n hazards.

Selected Publications

1) Tobita, T., and Sawada, S., 2004, Rotation response of a rigid body under seismic excitation (under preparation for publication).

2) Tobita, T., Iai, S. and Rollins, K., M ., 2003, Group pile behavior under lateral loading in centrifuge model tests, (Submitted to International Journal of Physical Modelling in Geotechnics).

3) Tobita, T., and Bardet, J. P., 2003, Energy-based liquefaction earthquake site response analysis, (under preparation for publication).

4) Bardet, J.P., and Tobita, T., 2003, Stress dilatancy modeling of saturated sand with energy method, (under preparation for publication).

5) Bardet, J. P., T. Tobita, 2002, Practical solution of free-surface seepage problems, Computers and Geotechnics, Vol. 29(6), pp. 451-475.

6) Bardet, J. P., T. Tobita, N. Mace, and ,Jianping, Hu, 2002, Regional modeling of liquefaction-induced ground deformations, EERI Spectra, Vol. 18(1), pp.19-46.

7) Sawada, S., Toki, K. and Tobita T., 1998, Characteristics of seismic ground motion estimated from rotation response of tomb stones, Journal of Structural Mechanics and Earthquake Engineering, Vol. 598/I-44, pp. 287-298. (in Japanese)

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< Waterfront and Marine Geohazards >

Professor : Hideo Sekiguchi

Biography

Qualifications

B. Eng.,Kyoto University, 1969

M. Eng., Kyoto University, 1971

Dr. Eng., Kyoto University, 1975

Academic Experience

Professor, Disas. Prev. Res. Inst. (DPRI), Kyoto Univ., 1997-present

Adjunct Professor, Graduate School of Engineering, Kyoto Univ., 1997-present

Adjunct Professor, Graduate School of Sciences, Kyoto Univ., 1997-present

Associate Professor, Department of Civil Engineering, Kyoto Univ., 1992-1997

Associate Professor, DPRI, Kyoto University, 1984-1992

Oversea Fellow Commoner, Churchill College, University of Cambridge, 1988-1989

Associate Professor, Department of Civil Engineering, Kanazawa Univ., 1978-1984

Research Associate, DPRI, Kyoto Univ., 1974-1978

Honors & Awards

Award of Merit for Exploratory Research, 1978, The Japanese Geotechnical Society.

Award of Merit for Excellent Research, 1982, The Japanese Geotechnical Society.

Oversea Visiting Fellowship, Ministry of Education (MONBUSHO), Oct.-Dec. 1990.

Award of Merit for Excellent Technical Writing, 1996, JSCE.

Professional Activities

Current memberships of learned societies:

Japan Society of Civil Engineers

Japanese Geotechnical Society

Int. Soc. Soil Mech. Geotech. Engrg

American Geophysical Union

Japan Society of Engineering Geology

Sedimentological Society of Japan

The Clay Science Society of Japan
Japan Soc. Marine Surveys and Technology
Japan Soc. Natural Disaster Science
Japan Assoc. Earthquake Engineering
Society of Materials Science, Japan
The Society of Rheology, Japan

Research Interest

Complex fluid-sediment interactions in waterfront areas, especially

1. Integrity of water-defence soil structures under extreme environmental forcing
2. Wave-soil interactions and related seabed processes
3. Tempo-spatial structure of sediment delivery systems in estuaries and shallow coastal oceans
4. The dynamics of submarine landslides, turbidity currents and slide-induced tsunamis.

Selected Publications

1) Sassa, S., Miyamoto, J. and Sekiguchi, H. 2003. The dynamics of liquefied sediment flow undergoing solidification, Proc. 1st Int Symp. Submarine Mass Movements and their Consequences, Nice, 95-102.
2) Sekiguchi, H., Kim, H., Miyamoto, J. and Tomohiro, Y. 2003. Dynamic interaction between fluid and liquefying soil under earthquake shaking, Proc. 12th Asian Regional Conf. Soil Mech. Geotech. Eng., Singapore, 331-334.
3) Sekiguchi, H. (2002). Recent advances in modelling soil responses to wave loading, Proc. Int. Seminar on Practice and Advances in Geotechnical Engineering, Shanghai, pp. 103-116.
4) Sassa, S., Sekiguchi, H. and Miyamoto, J. 2001. Analysis of progressive liquefaction as a moving-boundary problem, Geotechnique, 51(10), 847-857.
5) Sassa, S. and Sekiguchi, H. 2001. Analysis of wave-induced liquefaction of sand beds, Geotechnique, 51(2), 115-126.
6) Sassa, S. and Sekiguchi, H. 1999. Wave-induced liquefaction of beds of sand in a centrifuge, Geotechnique, 49(5), 621-638.
7) Sekiguchi, H., Kita, K., Sassa, S. and Shimamura, T. 1998. Generation of progressive fluid waves in a geo-centrifuge, Geotechnical Testing Journal, ASTM, 21(2), 95-101.
8) Sekiguchi, H., Kita, K. and Okamoto, O. 1995. Response of poro-elastoplastic beds to standing waves, Soils and Foundations, 35(3), 31-42.
9) Sekiguchi, H., Kita, K., Hashimoto, K. and Katsui, H. 1996. Deformation of composite breakwaters due to ground shaking, Soils and Foundations, Special Issue, 169-177.

10) Sekiguchi, H. and Ohmaki, S. 1992. Overturning of caissons by storm waves, Soils and Foundations, 32(3), 144-155.

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< Waterfront and Marine Geohazards >

Associate Professor : **Takao Yamashita**

Biography

Qualifications

B. Eng., Kyoto University, 1975

M. Sc., Kyoto University, 1977

Dr. Eng, Kyoto University

Academic Experience

Associate Professor, Disaster Prevention Research Institute, Kyoto University, 1994.3 -present

Visiting Scholar, Ocean Eng. Prog., Texas A&M University, 1985.11-1986.9

Research Associate, Disaster Prevention Research Institute, Kyoto University, 1977.4-1994.2

Honors & Awards

Invited Speaker in the 2nd Symposium on Coastal Ocean Environment Recovering Technology, Okayama, July, 2003.

Invited Speaker in the Inter-Ministry Workshop on Natural Disaster Prevention in Indonesian, Jakarta, December, 2002.

Invited Speaker in the Annual Meeting of Korean Society of Coastal and Ocean Engineers, Seoul, Sept.1996.

Invited Speaker in the Annual Meeting of Korean Society of Coastal and Ocean Engineers, Ansan, Sept., 1995.

Professional Activities

Member of the Editorial Board, Journal of Korean Environmental Science, KENSS, 2002-present.

Member of the Editorial Board, Coastal Engineering Journal, JSCE, World Scientific, 1994-2003

Research Interest

The following subjects of disaster prevention/mitigation and environmental preservation in the coastal ocean are my current research themes. These are mainly conducted as a joint research by means of DPRI's observational facilities (T-shaped Nearshore Dynamics Observation Pier, Storm Surge Observation Tower) and state-of-the-art computational technology.

1. Dynamics of storm surges and high waves caused by typhoon.
2. Interactive system of wind-wave-current in the coastal ocean.
3. Prediction of changes in beach morphology and coastal environment.
4. Four-dimensional monitoring and prediction system for meteorological and coastal hazards and environmental changes in the coastal ocean.

Selected Publications

1) Kim K. and T. Yamashita: Tidal Simulation in the Ariake Sea by Parallelized Ocean Model, Recent Advances in Marine Science and Technology PACON 2002(PACON2002), PACON International, 2003, pp. 267-278.
2) Yamashita, T. and Y. Nakagawa: Storm Surge Model in Wave-Shoaling Region, 28th Int. Conf. on Coastal Eng., ASCE, pp.201-208, 2002.
3) Kato, S., T. Yamashita and Abbas Y. B.: LISST/ADCP Observation of Suspended Load Profiles in the Surf Zone, PACON2002, PACON International, 2003, pp. 373- 384.
4) Yamashita, T. and K. Fukujin: The red-tide prediction model with consideration of inter-specific competition between phytoplanktons, PACON2000, PACON International, 2001, pp.99-110.
5) Kato, S. and Takao Yamashita : Three-Dimensional Simulation and Its Verification by ADCP Observations for Coastal Currents, PACON2000, PACON International, 2001, pp.89-98.
6) Yamashita, T., Y. Tsuchiya, D.R. Basco and M. Larson : Mutual Evaluation of Beach Preservation Methods in US, EU and JAPAN, Proc. Of Coastal Eng, JSCE, Vol.44, 1997, pp.691-695 (in Japanese).
7) Watson G. and T. Yamashita : Nearshore and Wave Effects in Storm Surges, Proc. 25th Int. Conf. on Coastal Eng., ASCE, 1996, pp.1417-1430.
8) Yamashita, T and Y. Tsuchiya: Numerical simulation of pocket beach formation, Proc. 23rd Int. Conf. on Coastal Eng., ASCE, 1992, pp. 2556-2566.
9) Yamashita, T., Y. Tsuchiya and D.R. Basco: Bore Front Modeling in Terms of Burgers Equation and Its Numerical Calculation Method, Proc. 21st Int. Conf. on Coastal Eng., ASCE, 1988, pp.2589-2602.
10) Yamashita, T. and Y. Tsuchita: Evolutional Behaviour and Instability of a Single Wave Packet, Nonlinear Water Waves, IUTAM Symposium, 1987, pp.47-54.

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< Waterfront and Marine Geohazards >

Associate Professor : Toyoaki Sawada

Biography

Qualifications

Dr. Eng.

Research Interest

The effect of the sediment transport system on the social foundation system is clarified based on the observation of floods and sediment transport phenomenon in a mountain watershed.

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Research Associate : **Shigeru Kato**

Biography

Qualifications

M. Sc., Gifu University, 1996

Dr. Eng., Gifu University, 1999

Academic Experience

Research Associate, Disaster Prevention Research Institute, Kyoto Univ., 1998.4-present

Honors & Awards

JSPS Research Fellowship for Young Scientist, 1996.4-1998.3

Research Interest

Research subjects are field observation and numerical simulation for coastal currents, waves, wind, material transport and preservation of environment in the coastal region.

Selected Publications

1. Kato, S. and T. Yamashita : Coastal current system and its simulation model, Hydro-Environmental Impacts of Large Coastal Developments (ACECC-TC1 Workshop Proc.), KSCOE & JSCE (B. H. Choi & W. Kioka Eds.), pp.219-227, 2003.
2. Baba, Y., T. Yamashita and S. Kato : Sea surface stress's relation to whitecap dissipation in the shoaling zone, Proc. 28th Int. Conf. on Coastal Eng., ASCE, p.247-257, 2002.
3. Kato, S., T. Yamashita, Y. Baba and N. Kihara : Cross-shore profile of wind and wave-induced coastal current system, Proc. 28th Int. Conf. on Coastal Eng., p.2824-2836 ASCE, 2002.
4. Kato, S, T. Yamashita and J. W. Park : Comparative observation of wind, wave and currents in the East (Japan) Sea, Proceedings of 1st Asian and Pacific Coastal Engineering Conference, p.400-410, 2001.
5. Yamashita, T., S. Kato and N. Kihara : Cross-shore profile of wind and wave-induced coastal current system, Proceedings of the Inaugural International Conference on Port and Maritime R&D and Technology, pp.269-272, 2001.

6. Kato, S and T. Yamashita : Three-dimensional model for wind, wave-induced coastal currents and its verification by ADCP observations in the nearshore zone, Proc. 27th Int. Conf. on Coastal Eng., ASCE, pp.3777-3790, 2000.
7. Kato, S and T. Yamashita : Three-dimensional simulation and its verification by ADCP observations in the nearshore zone, Recent Advances in Marine Science and Technology 2000, PACON International, pp.89-98, 2000.
8. Kato, S. and T. Yamashita : Three-dimensional simulation model for coastal currents and beach changes, Proceedings of Korea-China Conference on Port and Coastal Engineering, pp.87-97, 2000.

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< Computational Mechanics >

Professor : **Naoshi Nishimura**

Biography

Qualifications

B.Eng., Kyoto University, 1977

M.Eng., Kyoto University, 1979

Dr.Eng., Kyoto University, 1988

Academic Experience

Professor, Academic Center for Computing and Media Studies, Kyoto Univ., 2002.7-present

Professor, Dept. Civil Eng. Kyoto Univ., 2002.4-2002.6

Associate Professor, Dept. Global Env. Eng., Kyoto Univ., 1994.4-2002.3

Instructor, Dept. Global Env. Eng., Kyoto Univ., 1991.4-1994.3

Instructor, Dept. Civil Eng., Kyoto Univ., 1979.4-1991.3

Also:

Post Doctoral Fellow, Northwestern Univ., 1983.9-1985.8

Visiting Scholar, Ecole Polytechnique, 1988.10-12,1989.3

Honors & Awards

Thesis Award, JSCE, 1984

IABEM Best Paper Award, 1992

Paper Award, JSCE Structural Eng. Symposium, 2001

Professional Activities

Steering Committee Member, Japan Society for Computational Methods in Engineering, 2001-present

Council Member, Japan Society for Computational Engineering and Science, 2002-present

Member of Technical Committee, Council for Science and Technology, Ministry of Education, Culture, Sports, Science and Technology, 2003-present

Research Interest

Boundary Integral Equation Method (BIEM) is one of major methods of computational mechanics, which is capable of predicting states within a body by analysing quantities only on the boundary. Our current interests include applications of BIEM to large scale problems with fast multipole methods, to

wave problems such as earthquake, acoustics and ultrasounds and to inverse problems such as non destructive evaluations.

Selected Publications

1) Y. Otani, and N. Nishimura, On the improvement and preconditioning for FMM for Helmholtz' equation in 2D, J. Appl. Mech. JSCE, Vol.6, pp.283-292, 2003
2) H. Yoshikawa and N. Nishimura, An Improved Implementation of Time Domain Elastodynamic BIEM in 3D for Large Scale Problems and its Application to Ultrasonic NDE, Electronic Journal of Boundary Elements, Vol.1, pp.201-217, 2003
3) T. Takahashi and N. Nishimura, A fast BIEM for three-dimensional elastodynamics in time domain, Eng. Anal. Boundary Elements, Vol.27, pp.491-506, 2003
4) N. Nishimura: Fast multipole accelerated boundary integral equation methods, Applied Mechanics Reviews, 55, 299-324, 2002
5) H. Yoshikawa, N. Nishimura and S. Kobayashi, Algorithm improvements and parallel computing of the three dimensional elastodynamic boundary integral equation method in time domain, J. Appl. Mech. JSCE, Vol.5, pp.199-206, 2002
6)K. Yoshida and N. Nishimura, A parallel implementation of diagonal form fast multipole BIEM, Trans JASCOME, Vol.19, pp.75-78, 2002
7) K. Yoshida, N. Nishimura and S. Kobayashi, Analysis of three dimensional scattering of scalar waves by cracks with fast multipole boundary integral equation method, Trans JSME (A) vol.67, no.653, 16-22, 2001
8) K. Yoshida, N. Nishimura & S. Kobayashi, Application of new fast multipole boundary integral equation method to crack problems in 3D, Eng. Anal. Boundary Elements, 25, 239-247, 2001
9) K. Yoshida, N. Nishimura & S. Kobayashi, Application of new fast multipole boundary integral equation method to elastostatic crack problems in 3D, J. Structural Eng. JSCE, 47A, 169-179, 2001
10) T. Takahashi, N. Nishimura and S. Kobayashi, Fast boundary integral equation method for elastodynamic problems in 2D in time domain, Trans. JSME (A) vol.67, No.661, 1409-1416, 2001
11) K. Yoshida, N. Nishimura and S. Kobayashi, A new fast multipole boundary integral equation method in elastostatic crack problems in 3D, Lecture Notes in Computational Science and Engineering, 19 (Eds., I. Babuska, P.G. Ciarlet and T. Miyoshi, 271-287, Springer, 2001
12) K. Yoshida, N. Nishimura and S. Kobayashi, Application of a diagonal form fast multipole BIEM to the analysis of three dimensional scattering of elastic waves by cracks, Trans. JASCOME, 18, 77-80, 2001

13) K. Yoshida, N. Nishimura & S. Kobayashi: Application of fast multipole Galerkin boundary integral equation method to elastostatic crack problems in 3D, Int. J. Num. Meth. Eng., Vol.50, 525-547, 2001

14) T. Takahashi, S. Kobayashi and N. Nishimura, Fast multipole BEM simulation of overcoring in an improved conical-end borehole strain measurement method, In; Mechanics and Engineering -- In Honor of Prof. Qinghua Du's 80th Anniversary, Z. Yao et al. (eds.), Tsinghua Univ. Press. pp.120-127, 1999

15) N. Nishimura, K. Yoshida & S. Kobayashi: A fast multipole integral equation method for crack problems in 3D, Eng. Anal. Boundary Elements, 23, 97-105, 1999.

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< Computational Mechanics >

Associate Professor : **Hisashi Hiraoka**

Biography

Qualifications

B. Eng., Kyoto University, 1974

M. Sc., Kyoto University, 1976

Dr. Eng., Kyoto University, 1993

Academic Experience

Associated Professor, ACCMS, Kyoto Univ., 2002.7-present

Research Associate, Dep. Global Environ. Eng., Kyoto Univ., 1981.4-2002.6

Research Associate, Dep. Archit. Eng., Kyoto Univ., 1978.4-1981.3

Research Interest

1) Modeling of urban thermal environment

2) Modeling of budgets of heat, water vapor, and carbon dioxide within vegetation

3) Soil respiration and carbon dioxide transfer in soils

Selected Publications

1) Hiraoka, H. " Modeling the budgets of heat, water vapor, and carbon dioxide within a tree", in 'Advances in Fluid Modeling and Turbulence Measurements', ed. by Wada, A., Ninikata, H., and Tanaka, N., World Scientific Publishing Co. Pte. Ltd. (2002) 727-734.

2) Hiraoka, H. "Simulating the microclimate produced by a single tree", First International Workshop on Architectural and Urban Ambient Environment (2002).

3) Hiraoka, H. "Modeling the budgets of heat and water vapor within vegetation: A verification study", J. Archit. Plann. Environ. Eng., AIJ, 558 (2002) 31-36.

4) Hiraoka, H. "An investigation of the effect on environmental factors on the budgets of heat , water vapor, and carbon dioxide within a tree", Third International Symposium on advanced Energy Conversion Systems and Related Technologies (2001) 718-724.

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Biography

Qualifications

B.Eng., Kyoto University, 1997

M.Eng., Kyoto University, 1999

Dr.Eng., Kyoto University, 2003

Academic Experience

Reaserch Associate, Dept. Global Env. Eng., Kyoto Univ., 2002.11-2003.3

Reaserch Associate, Dept. Civil and Earth Resources Eng., Kyoto Univ., 2003.4-present

Research Interest

I investigate boundary integral equation methods. I am particularly interested in time domain problems and am doing research on quantitative non destructive evaluation of flaws and defects within structures using a time domain boundary integral equation method.

Selected Publications

1) H. Yoshikawa and N. Nishimura, An improved implementation of time domain elastodynamic BIEM in 3D for large scale problems and its application to ultrasonic NDE, Electoric Journal of Boundary Elements, Vol. 1, Issue 2, (2003), 201-217.

2) H. Yoshikawa, N. Nishimura, and S. Kobayashi, Algorithm improvements and parallel computing of the three dimensional elastodynamic boundary integral equation method in time domain, Journal of Applied Mechanics JSCE, Vol. 5, (2002) 199-206.

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Structural Mechanics Laboratory

Creative Structural Design and Analysis

The keywords for this laboratory are "Earth and Human" and "Mellowness" looking for developing "beautiful", "rich", "pleasant", "safe", "wholesome" and "energetic" societies. The laboratory is conducting static and dynamic studies as related to structural design and structural mechanics on the short-, middle- and long-term view points flexibly following the socio-cultural developments leading to the heritage of cultural, social and environmental assets under the general philosophy of sustainable development.

The main targets of the studies are to clarify the processes of load distribution and deformation and time-dependent change of strength and serviceability of structures.

Development of international on-line parallel pseudo-dynamic testing

The space which extends to several ten thousand km above the surface of the Earth from 20km below the surface which have not been fully utilized until now seems to be the new frontier for the 21st century. The precise study on the dynamic interaction among fluid (e.g., water and wind)-soil-structures is necessary in order to enable the utilization of such new space. Consequently, an international on-line parallel pseudo-dynamic testing which connects facilities for water tank tests, wind tunnel tests, geomechanical tests, structural tests through networking seems to be effective in order to consider the dynamic interactions (left figure of figure 1).

Through the recent development of the information science technology with the worldwide improvement of the Internet, rapid information sharing has been facilitated using computer network. Therefore, since information can be transmitted precisely and quickly through the computer network, the above mentioned large-scaled experiment which was only a dream in the past seems to have become a reality under distributed environment by remote control.

In fact, an international on-line pseudo-dynamic testing was conducted connecting experimental facilities of both Korea Advanced Institute of Science and Technology (KAIST) and Kyoto University through the Internet as shown in right figure of figure 1. In this test, seismic response behavior of an isolated elevated bridge with LRB (Lead Rubber Bearing) was clarified. It was thus verified that this testing system works efficiently.

By using this experimental technique, it may be possible to evaluate and examine the dynamic interaction of multi-degree of freedom structure, and it seems to greatly contribute to the elucidation of complicated physical phenomenon on the earth through international research collaboration.

Figure 1 Concept of international on-line parallel pseudo-dynamic testing (left figure) and the verification testing (right figure)

Elucidation of mechanical behavior of steel and composite structures and development of a rational design method

Because steel has excellent strength and ductility, it is one of the most frequently used structural materials. Many new materials have also been developed in recent years, and are being used as hybrid materials as combined with steel.

Steel is often used for thin and slender structural

members because of its excellent properties. Therefore, mechanical behavior such as buckling phenomenon is important in steel and steel composite structures. Mechanical behavior of these structures is evaluated by loading tests and numerical simulations, and a rational design method is also developed.

Figure 2 shows the loading test (left figure) and the result of the numerical simulation (right figure) of steel rigid-frame pier. These results are in good agreement with the damages observed in the great Hanshin-Awaji Earthquake. Moreover, mechanical behavior of hybrid structures including corrugated steel PC web bridges is being studied.

Like human bodies, structures tend to deteriorate with time. Because of a huge stock of steel structures in Japan, the maintenance is becoming more and more important. Therefore, a study on the maintenance and anti-corrosion of the steel structures has recently started.

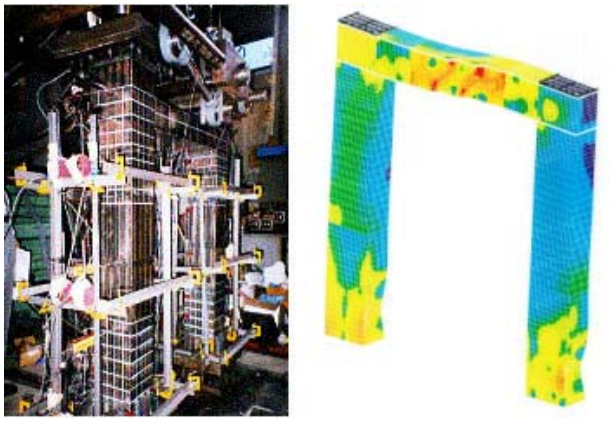


Figure 2 The loading test (left figure) and the result of the numerical simulation (right figure) of steel rigid-frame pier

Development of numerical analysis tools for dynamic response analysis of Very Large Floating Structures

In order to guarantee safety and serviceability of Very Large Floating Structures (VLFS) such as "Floating Bridge" and "Floating Airport", it is essential to estimate accurately dynamic responses of deflections, accelerations and stresses as well as rigid-body motions due to excitations by waves. In the analysis, dynamic fluid-structure interaction effect must be considered. Until now, many studies have been done on this topic, where only idealized models can be treated. However, in real projects, "response analysis for complicated models (complicated shape consisting of many structural components) with ultra-large degree of freedom" is required; which is still a very difficult problem to be solved even when we use a world top-class parallel computer.

Figure 3 shows numerically analyzed results of deflection amplitude (left figure) of pontoon-type VLFS (length=1,500m, width=150m) and snapshot for water-elevation (right figure) around the VLFS located in a real natural reef sea by newly-developed "accelerated Green's function method". In this numerical example, both variable sea-bed surface and wetted surface of the VLFS are discretized into panels with 67,098 unknowns, and solved by a parallel computer (IBM RS/6000 SP 5CPUs) with 38.4 hours. Now, research progress is under way for further acceleration of the method and extension to non-linear problems.

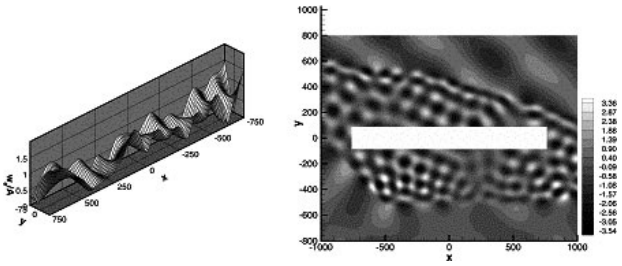


Figure 3 Deflection amplitude (left figure) of pontoon-type VLFS (length=1,500m, width=150m) and a snapshot for water-elevation (right figure) around the VLFS located in a real natural reef sea

Bridge Engineering Laboratory

Investigation of structural design and maintenance - through mechanics of bridge and wind -

To consider the safety of structures including bridges accurately, precise prediction and evaluation of their response due to natural actions and application them to their design are significant. In this group, to estimate the structural behavior due to wind action, various investigations related to wind engineering have been conducted, for example, evaluation of strong winds, bluff body aerodynamics, development of aerodynamic countermeasures, mechanisms of wind disaster and so on. Also, the flow induced vibration of gate structures is investigated. Furthermore, a new type of bridge structure using standardized parts, which is easy to be repaired and extended, are now investigated including their structural properties towards the proposal of advanced bridge structures.

Mechanisms of flutter instabilities of structures

The flutter phenomenon occurs on the structures due to self excited force induced by their body motion. This vibration diverges beyond a certain critical wind velocity, which may destroy the structures, and then the safety of structure against the flutter must be very important.

Investigation on the flutter mechanism is connected to establishment of advanced wind resistant design and development of more sophisticated structural geometry against the flutter. In this group, the relation between the aerodynamic forces and the responses has been clarified through the wind tunnel tests of unsteady aerodynamic forces and pressures. The bridge decks, which are stable against the flutter, have been found and the continuous studies for their future realization and more precise evaluation of their responses are on going.

Figure 1 Wind tunnel facility

Wind-induced vibration of inclined stay cables

It is well known that the stay cables of cable-stayed bridges vibrate under wind and rain, which is so called rain-wind induced vibration.

In this group, the wind tunnel tests and field observations using cable models have been tried and then, it becomes clear that this phenomenon induced by the axial flow along the cable axis due to the cable inclination, the upper water rivulet on the cable surface due to rain, unsteady and three dimensional properties of vortices around inclined cables and also mixed phenomena of these. However, there are still many unknown facts for the inclined cable aerodynamics. Then, the further investigations for their mechanisms and the development of rational countermeasures will be tried.

Figure 2 Field observations using large-scale inclined cable model at Shionomisaki

Spatially correlated structure of surface pressure on bluff body in fluctuating wind

Buffeting phenomenon as random vibration due to wind turbulence can be observed in all structures in the atmosphere at any wind velocity. It may induce fatigue problem of structures, and takes an important role on wind load evaluation as well. In the buffeting response analysis, spatial correlation (coherence) of the aerodynamic forces induced by wind fluctuation, or the correlation of surface pressure are assumed to be identical to the correlation of the approaching wind velocity. Whereas, the aerodynamic forces indicates higher correlation in wind tunnel experiments.

This study aims to clarify the mechanism of increase of the correlation. According to the previous investigation, it was found that the flow separation and the separation bubble should be the most important factors. Quantitative evaluation of the spatial correlation and development of the evaluation method for each structural geometry will be investigated.

Development of rational and environmental bridge design assembled by standardized parts

Structural systems assembled by the standardized parts and their design method are investigated. Also, the development of maintenance system, which is possible to extend the lifetime of structures by replacement of the elements and expand the system with social demand, is tried.

First of all, the various types of bridges are considered as assembly of elements, and the bridges will be re-constructed by using the standardized elements again. The standardization of bridge elements can introduce mass production and the drastic reduction of costs is expected. Furthermore, using steel as the material of bridge, the recycling of the bridge parts is considered and then, the reduction of environmental impacts may be possible.

Structural Materials Engineering Laboratory

Strong, Beautiful and Durable Concrete Structure

The prime research activities of our lab are on the performances and applications of various necessary structural materials in civil engineering field, where a variety of concrete-based materials are focused on because of their enormous adoption in the current civil structures. "From Molecule Structure to Civil Structure" may exactly outline the feature of this lab. It means that our research works span a wide range, from the various concrete materials to the civil structures such as reinforced / prestressed concrete structures and composite ones. Besides, durability and health evaluation of the concrete structures, re-pair and strengthening of the deteriorated struc-tures, synthetic polymer materials which are gaining the popularity increasingly in recent years, and other new emerging materials are also contained in our research directions.

Researches on performance-based design method of concrete structures

Performance-based design approach concerns with the failure probabilities of the structures and/or members in the limited states related to various required performances under the specified loading and/or environmental conditions. Under this topic, various investigations on the concrete structures in the ultimate limited state, serviceability limited state, fatigue limited state and durability limited state are being carried out in order to establish a more advanced and precious design methodology.

Researches on mechanical characteristics of concrete structural members

The prime requirement of the reinforced concrete (RC) and prestressed concrete (PC) members is the safety under the prescribed loading conditions. Especially, it is indispensable for the structure members to possess enough ductility to absorb and dissipate significant external energy, such as seismic force. Investigations on the plastic properties, namely, load carrying capacity, ductility and energy dissipation, of various concrete structure members subject to different loading conditions are being carried out under this topic.

Researches on durability and scenario design of concrete structures

On basis of deterioration sources of concrete structures, the deterioration mechanisms are illuminated and mathematic models are developed accordingly. Concurrently, the effects of these deterioration factors on the characteristics of the concrete structures and members are investigated by experimental studies such as the in-site exposure tests. Furthermore, the improvement in the simulation technique for deterioration prediction, the establishment of a monitoring system for deterioration mechanisms, and the techniques for the advancement of the high-durability of concrete structures etc. are being investigated in combination. The scenario for controlling the time-dependent behaviors of concrete structures is being composed and developed ceaselessly.

Researches on health evaluation approaches and maintenance management techniques

Maintenance management of the concrete structures is requisite for the sustainability and feasibility of social development. Exploration and development of health evaluation system for the deteriorated and/or damaged concrete structures is the main purpose of this topic. Based on the requirement of retrofit or upgrade in terms of the durability and load carrying capacity after evaluation, the repair

and/or strengthening techniques can be proposed. A systematic selection methodology including the selection of the repair and strengthening materials and the related construction techniques is being proposed and examined depending on the efficiencies of these materials and techniques.

Researches on improvement of concrete performances and applications of advanced materials

Different types of techniques to improve the performances of concrete are under investigations. Among others, the applications of the high-strength concrete/steel, transversely confined concrete for ductility improvement, various admixtures and polymer materials for durability improvement are some typical ones. Moreover, researches on the applications of eco-materials, for instance, fiber reinforced plastic that has attracted much attention for its excellency under corrosive environment and cement made from urban wastes etc, are also being carried out.

Applied Mechanics Laboratory

Modeling of mechanical behavior and its numerical simulation

The most important thing for the development of infrastructures is to ensure their safety quantitatively from the standpoint of mechanics at all the steps, such as planning, design, construction and management. To this end, we carry out researches on the fundamental mechanics and its application. Simultaneously, we will educate and nurture the young researchers who are able to inherit and spread fruitful results of Engineering Science.

As far as studies on the applied mechanics are concerned, the most important thing is to construct a simple model of mechanical behavior as long as the observed data in site investigations or model tests are rationally explained. To carry out these researches, fundamental knowledge of mathematics and mechanics is requisite. We also attach weight to education of these subjects to younger generations.

Mechanics of particle assembly

For the mechanics of granular media, such as sands and so on, macroscopic mechanical behavior is depending on the motion of individual particles and interaction between plural particles.

Although, various microscopic models are proposed to explain a macroscopic behavior of granular media, most of those models use so-called a virtual spring between the particles in contact.

In order to investigate its validity and limit, behavior of this idealized model is simulated numerically and is compared to the observed experimental data for round particle assembly.

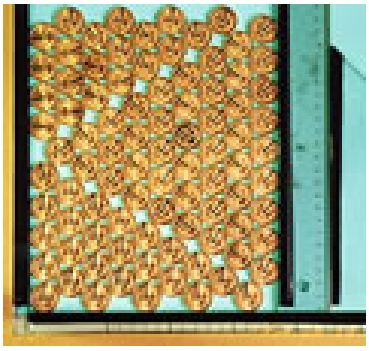


Figure 1　Model test of particle assembly by using 10 yen coins

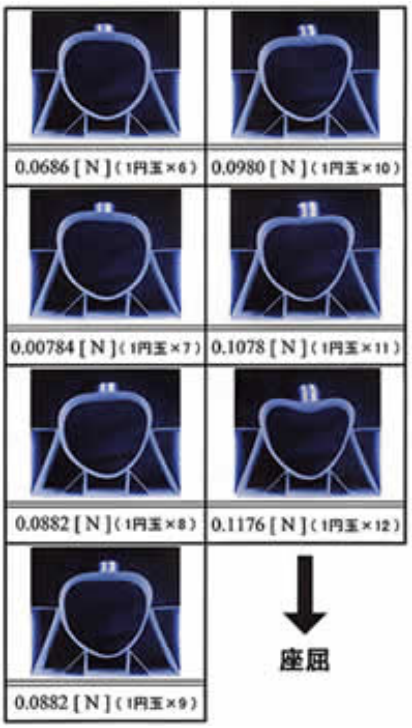


Figure 2　Model test of buckling failure by using 1 yen coins and a hollow paper support

Rational design procedure in tunnel engineering

Stability of a tunnel structure is secured by the surrounding soil and tunnel supporting units.

Fundamental aspects of its stability is explained by so-called NATM in Japan. However, its mechanical explanation is insufficient and is not completed yet.

In this study, stability of the surrounding soil is explained from the point of the generating mechanism of earth pressures acting on the tunnel supporting units.

Also, an inspection method for the safety of tunnel supporting units to buckling failure is investigated and developed.

Development of Dam Reservoir Sedimentation Management methods

Reservoir Sedimentation Management is recognized as the key issue for sustainable management of water resources toward the next generation and the integrated management of sediment flow systems. Reservoir sedimentation management in Japan has made a remarkable progress by achievement of advanced examples such as combination sediment flushing in the Kurobe River (Figure 3) and sediment bypass systems in the Asahi and the Miwa Dams. In order to support this significant engineering topics, I am doing several studies by using numerical simulation and field investigation methods, such as

1) Assessment of proposed sediment management measures,
2) Prediction of sediment movement in reservoirs and downstream rivers during sediment flushing operation,
3) Development of the venting method of density currents in reservoirs caused by flood flows containing fine and high concentrated sediments, and
4) Development of recycling methods of accumulated sediment in reservoirs.

As the new technology that takes the place to a conventional optical method (turbidity meters) for sediment flow monitoring in the field, I am also developing a new suspended sediment concentration measuring system with differential pressure transmitter (SMDP). Field tests of a submersible type for reservoirs and a water circulating type for general rivers are now carried out in the Kurobe River and the Tenryu River etc.

Mathematical structure of limit / shakedown analysis and its numerical simulation method

Metal forming, bearing capacity and slope stability

Figure 3　Combination flushing of the Unazuki Dam in the Kurobe River(June, 2001)

problems are sometimes treated as rigid-plastic boundary value problems, because elastic deformation is small and negligible in comparison with plastic deformation. Limit analysis is well known as a mighty basis to solve such kinds of problems.

Rigid plastic finite element method (RPFEM) based on the upper bound method is widely used as a powerful numerical tool for these problems.

On the other hand, the lower bound method which is dual to the upper bound method is rarely used. In this study, in order to utilize the duality of limit analysis, a hybrid type rigid plastic finite element method which combines both the primal problem (the lower bound method) and the dual problem (the upper bound method) together, is newly formulated from the standpoint of nonlinear optimization theory.

In addition to this, applicability of similar methodology to shakedown analysis which can be recognized as a generalization of limit analysis is investigated.

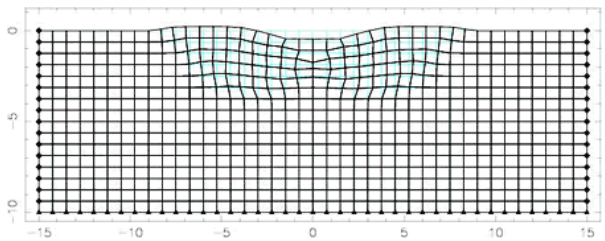


Figure 4　Failure mode of a shallow foundation subject to vertical uniform load

Environmental Hydrodynamics Laboratory

Environmental Fluid Mechanics using Innovative Accurate Turbulence Measurements and Computational Fluid Dynamics

It is quite necessary in Hydraulic Engineering to investigate hydrodynamic characteristics in open-channel flows with various boundary conditions for preventing water-disaster, river environment and aquatic eco-systems. In particular, it is very important to reveal turbulence dynamics in such free-surface flows, because turbulence motions have great influences on momentum and sediment transport in rivers as well as gas-transfer at the free-surface region.

Therefore, our hydraulics laboratory are investigating the following topics.

1. Turbulence Interaction between Air and Water at Free Surface

2. 3D Turbulence Structure in Depth-varying Compound Open-Channel Flows

3. Numerical Modeling and Computations of Two-Phase Flow

4. Sediment Transport in Open-Channel Flows

5. Hydrodynamic Characteristics in Open-Channel Flows with Side-Cavities

Turbulence Interaction between Air and Water at Free Surface

This study focuses on air-water interfacial turbulence and scalar transfer phenomena across the interface in wind-induced open-channel flows indicated (see Fig.1). The study includes not only experimental measurements of air-water interfacial turbulent structures and the concentration of dissolved oxygen by several sets of laser Doppler Anemometers (LDA) indicated in Fig.2, Particle-image Velocimetry and DO meter, but also numerical prediction on two-fluid flows phenomena

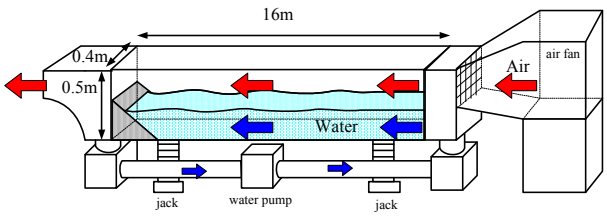


Fig.1 Wind-induced open-channel flows

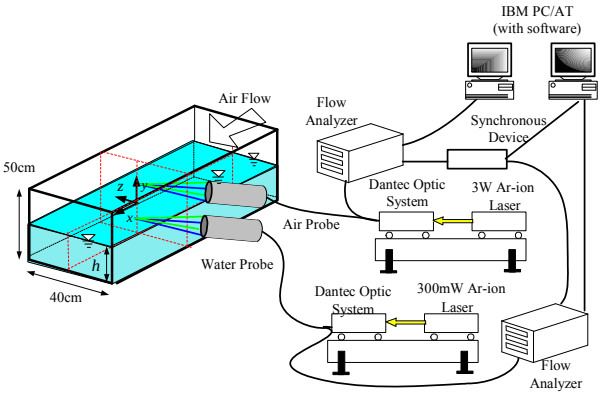


Fig.2 LDA measurements system

with multiphase incompressible immiscible materials. The goal of the study is to clarify the air-water turbulent phenomena and to evaluate the turbulent scalar transport with good accuracy by means of experimental approaches and the proposed numerical procedure.

3-D Turbulence Structure in Time-dependent and Depth-varying Unsteady Open-channel flows

In compound open-channel flow that is composed of a main-channel and floodplains, there are considerable differences in primary velocities and turbulence at the junction between them. Because such hydrodynamic and turbulence features promote the transverse transport of momentum and various fluid scalars such as suspended sediments, it is quite necessary in hydraulic engineering and river environment to reveal the turbulent structure in compound open-channel flows. Many researchers have studied on compound

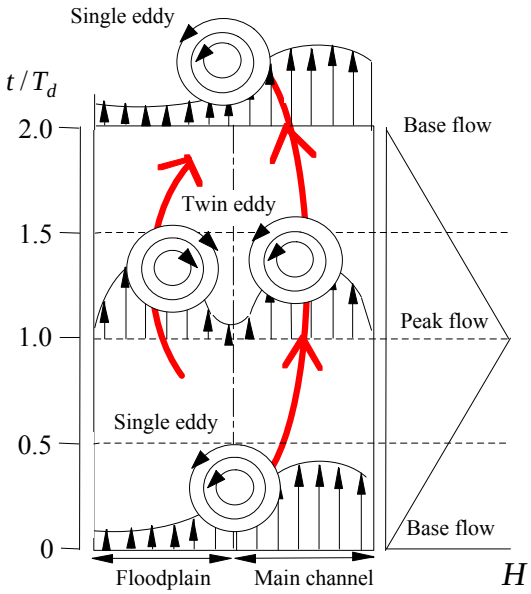


Fig.3 Time-variation of horizontal vortices in unsteady compound open-channel flows

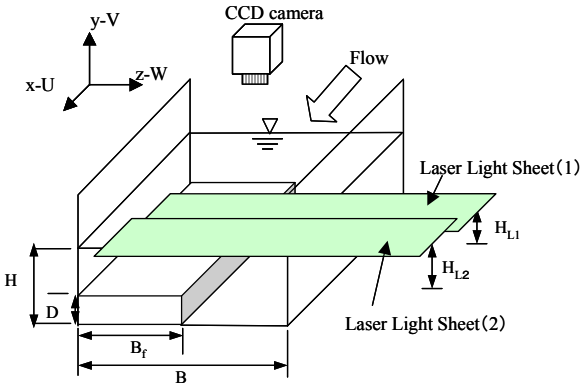


Fig.4 Dual-layer PIV measurements in compound open-channel flows

open-channel flows by both the experimental and numerical methods.

However previous studies almost have been conducted on depth-fixed steady flows. Therefore, we have investigated the 3-D hydrodynamic characteristics in depth-varying unsteady compound open-channel flows by numerically and experimentally.

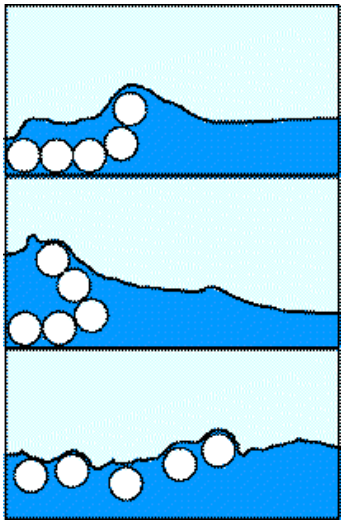


Fig.5 Predicted free-surface flows including solid particles

Our main researches are as follows:

1) 3-D numerical analysis of turbulent structures in depth-varying unsteady compound open-channel flows

2) Generation and development process of coherent vortices (see Fig.3) in depth-varying unsteady compound open-channel flows (by dual-layer special PIV measurements indicated in Fig.4)

3) Bed shear stress on floodplain in depth-varying unsteady flows with the transition stage from rectangular to compound channels (by LDA measurements)

Computational Fluid Dynamics (CFD) for Complex Fluids

The mathematical models and computational methods are developed to understand and numerically predict the complex fluid system.

The main targets of this CFD approach are liquid flows including large solid particles accompanied by unsteady wakes, wind-driven water waves and immiscible two-fluid system,which are generally found in hydraulics phenomena.

The following results are currently obtained:

1) A unified computational method is proposed for the incompressible multiphase flows (see Figure 5). In the gas-liquid flows, this approach enables us to trace the large deformation of the interfaces.
In addition, for the liquid-solid flows, it allows us to predict unsteady wake flows caused by solid particles and to evaluate the fluid resistance force acting on the particles. The contact forces among particles can be taken into account by means of a DEM model.
2) Some accurate and efficient numerical procedures are proposed for the collocated grid system based on the finite difference and finite volume methods.
The higher-order schemes are proposed for non-linear terms together with the flux control method to prevent numerical oscillations.
Furthermore, some numerical algorithms are developed, such as an implicit procedure in the collocated grid system, an accurate velocity-pressure relaxation method and parallel computation techniques based on a domain-decomposition method.

Mechanism of Sediment Transport in Open-Channel Flows

In natural rivers, sand particles are moved by water flow near the bed as shown in Fig.6. It is well known that a law of the flow resistance is influenced by sand-particle motions. Therefore, an investigation on interactions between the fluid and sediment particles in open-channel flows is quite important in hydraulics and river engineering.

Hydrodynamic Characteristics in Open-Channel Flows with Side Cavities

In recent years, environmental functions in rivers have been attended. Therefore, maintenance and management policies for actual rivers are needed to consider various environmental problems. For example, “Wando” has been noticed as one of environmental hydraulic structures in actual rivers as shown in Fig.7). Wand means a side-cavity in rivers, which is made by set groins in rivers bank. In and around Wando, variable aquatic eco-systems are formed.
However, Wando planning method is still in trial and error steps, and experimental or numerical calculation data will be necessary to establish the rational plan guidelines of Wando. So, we have been carrying out the turbulent measurements and analyzing flow properties in such Wando regions.

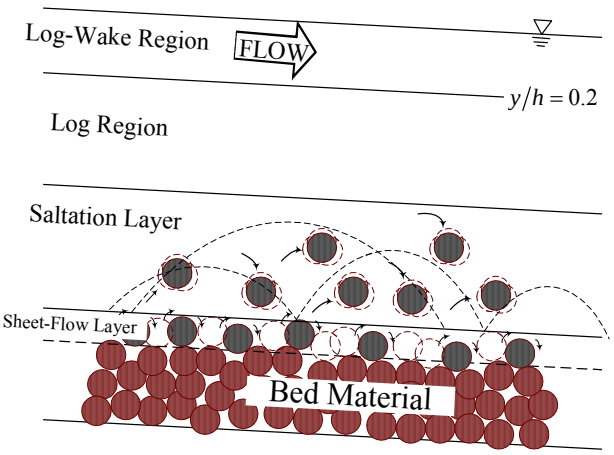


Fig.6 Sediment transport in open-channel flows

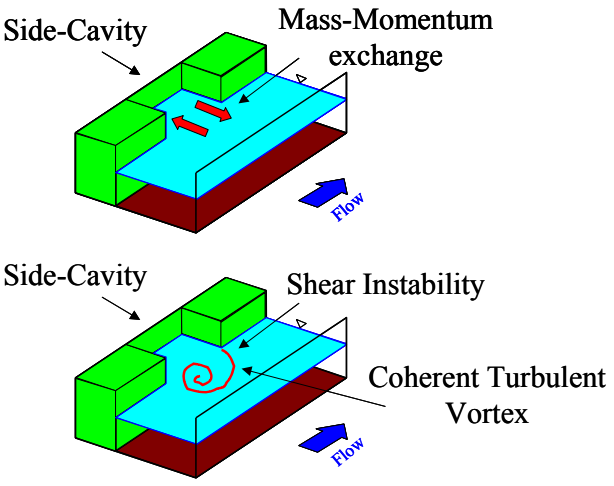


Fig.7 Hydrodynamic characteristics in open-channel flows with side-cavity

Geomechanics Laboratory

Simulations of deformation and failure for the ground supporting civil structures

Geomaterials support all of the civil structures and environments as a ground. Therefore, we need to study the response of geomaterials to the construction of structures, earthquakes, weathering, the changes of climate etc. accurately in order to build the civil structures and maintain environments safely.

Our research activities focus deals on one hands with constitutive models for geomateials through laboratory tests and on the other hand with the development of computational simulation tools to predict the deformation and failure of geomaterials. Geomaterials include natural materials such as sand, clay, rock, and gas hydrate containing material, and also artificially improved soils. Using constitutive models, we simulate of the deformation and failure phenomenon of ground composed of multi-phase geomaterials. Specifically, we focus on liquefaction analysis and making a hazard map, numerical simulations of large deformation and failure problem with strain localization of both shear and compressive strains. Furthermore, the problem of deformation of the ground containing methane hydrate due to the change of confining pressure, temperature, and phase change of gas hydrate are included in our research activities.

Development of numerical methods to predict large displacement and failure phenomena precisely

Failure phenomena such as landslides and slope failure involve strain localization and the discontinuity of displacement. In addition, the localization of the compressive strain, that is, compaction bands, causes large settlement of the ground. Therefore, we need to investigate the mechanism of the localization of deformation, and develop an accurate analytical method in order to predict large deformations and failure phenomena, and prevent natural disasters.

Experimental research includes triaxial compression tests with rectangular specimens of clay. We observe the failure process using image analysis so that the complicated failure phenomena with strain localization under three dimensional conditions can be precisely observed. Furthermore, the laboratory tests are simulated by means of large scale three dimensional finite element method based on soil-water coupling theory. We investigate the mechanism of strain localization, and then develop the analytical methods for the accurate prediction of the failure phenomena.

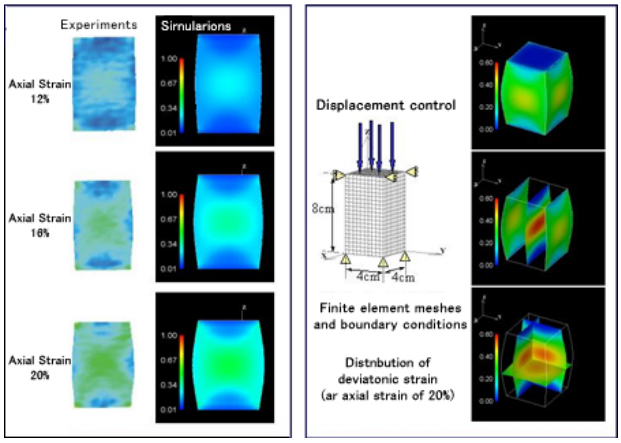


Figure 1 Simulations of triaxial compression tests by 3D finite element method

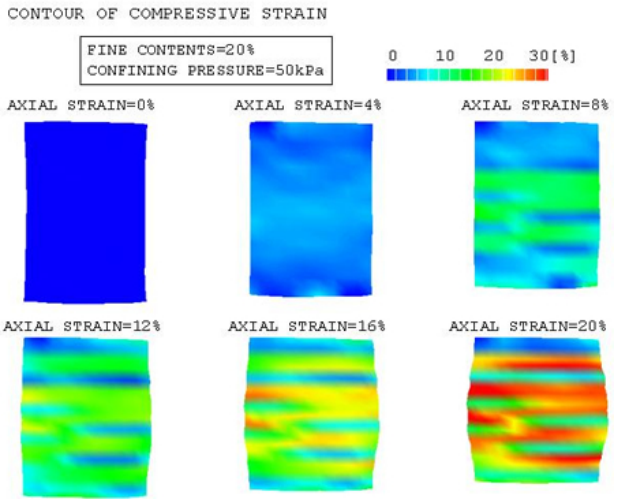
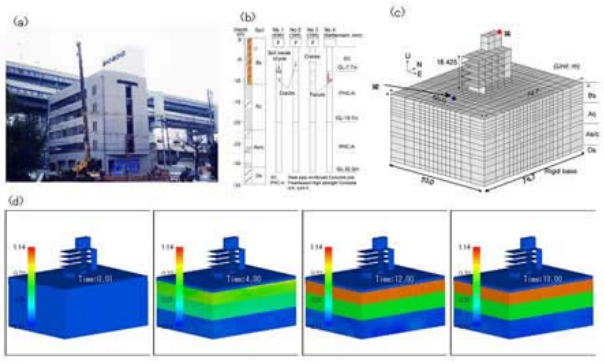


Figure 2 Observations of compaction bands during triaxial compression test

Development of high-efficient liquefaction analyses and making a hazard map

Liquefaction has been studied since public apartments were destroyed due to the 1964 Niigata earthquake. Liquefaction phenomenon was also observed at Port Island during the 1995 Hyogoken Nanbu earthquake. It is one of the most important geotechnical problems regarding to earthquake disasters. Since the recent trend of the seismic design method for soil structures is shifting to the performance-based design, the development of numerical methods to predict liquefaction is necessary for disaster prevention.

We focus on the liquefaction analysis method based on the dynamic finite element method, in which equations of motion of fluid-solid mixture with the effective stress concept are adopted. We are developing highly-efficient analytical methods by which soil-structure interaction, large deformations of the liquefied ground and the relative acceleration of soil and water are taken into account. In addition, as measures to liquefaction soil improvement methods, such as chemical grouting, are



(a) Picture of the building

(b) Soil profile

(c) Finite element meshes for soil-pile-structure

(d) Changes of excess pore water pressure ratio in the ground (Red zone indicates liquefied area)

Figure 3 3D analysis of soil-pile structure during earthquakes

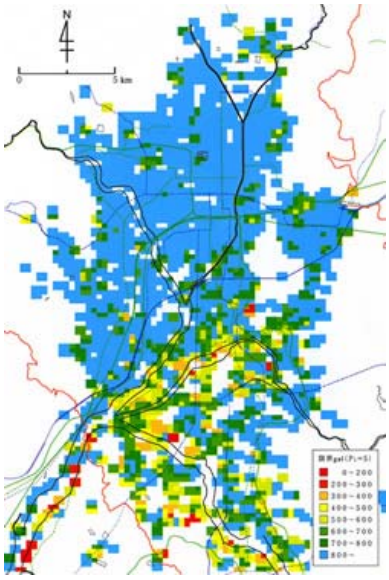


Figure 4 Hazard map of liquefaction at the Kyoto Basin (In the case of an near-land earthquake: red zone indicates high possibility of liquefaction)

investigated through both experiments and numerical analyses. Using a data base of ground information over a wide area, we are developing a hazard map by which we can evaluate the risk of liquefaction.

Characterization of geomaterials and the formulation of constitutive models

Geomaterials include improved soils mixed with chemical materials, such as, cement and water glass, as well as sand, clay, rock, and gas hydrate which has been sedimented in nature. They are basically made of grains, and the void is filled with water, air, and other material; geomaterials are multi-phase mixture. They are inherently inhomogeneous and exhibit a great variety of characteristics, and they are fundamentally different from artificial materials such as metal and plastics in this respect. Since we need an appropriate constitutive model which can describe mechanical behavior of material in order to simulate the deformation, failure phenomena, and liquefaction precisely, the development of constitutive model is inevitable for geomechanical engineering.

Focus is on the mechanical, hydraulic, and thermal

properties of geomaterials, which have non-linear characteristics. For example, time-dependent behavior, degradation of soil structures, and anisotropy of natural deposits are modeled through laboratory tests under several loading conditions. In addition, strain-gradient dependency, instability of the material, and thermal-dependency on the mechanical behavior are taken into account in order to apply the model to the simulations for failure phenomena including the problem of strain localization, as previously mentioned. A liquefaction analysis requires an accurate cyclic model for sand and clay, which is useful under seismic loadings. A cyclic model for the ground which is improved by artificial materials, such as water glass for the prevention of liquefaction, is also studied for the seismic design.

Figure 5　Hollow cylinder shear test apparatus available for several loading condition

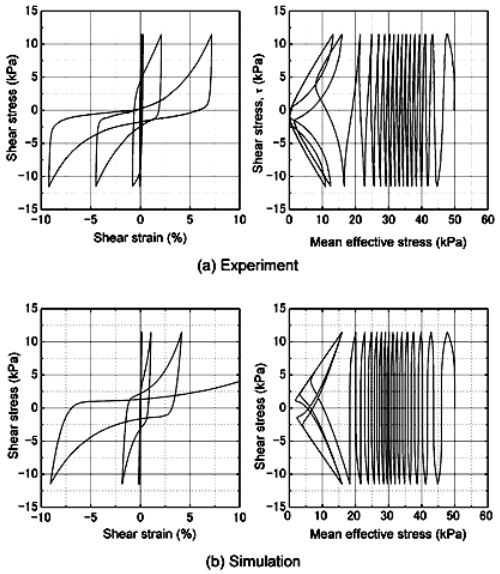


Figure 6　Cyclic loading tests (upper), and simulations (lower) for sand

Characterization for soils containing methane hydrate

Methane hydrate is being watched as a new energy for the next generation. It has been observed underneath the sea ground around Japan, and its constant production will bring us nationally produced energy resource. It is a possible resource for producing hydrogen for a fuel cell as well as for a natural gas. The production process is, however, still under development at present. The extraction of the gas may cause large compressive settlement, a landslide under sea flower, and big emission of the gas.

The aim of our research is to develop a technology for the efficient extraction of gas hydrate and the maintenance of the ground. Researches on the development of computational methods for predicting mechanical, hydraulic, chemical and thermal behaviors of the ground including gas hydrate, are conducted through the experimental evaluation of material property.

Geophysics Laboratory

Sensing technology to create the eyes looking inside the earth

We, the people in the 21st century, are facing problems on subsurface (crust of the Earth) including development of energy resources, utilization of underground spaces and preservation of the Earth's environment. A doctor of the Earth with "eyes looking inside the Earth" and "arms sensing inside the Earth" can help solve these problems.

We are studying geophysical prospecting methods that can look and feel inside the Earth. They utilize the physical phenomena such as seismic wave, electrical current and electromagnetic wave and measure the Earth in a nondestructive way from remote places.

Geophysical prospecting is interdisciplinaly. It is based on geophysics and has a close relation to many fields both in science and in engineering including geology, resources engineering, electronics and so on. It is a "Informatics on subsurface".

Shallow subsurface survey using geophysical prospecting methods for infrastructure and geo-environment

It is not easy to delineate the geological condition and the physical properties of soil and rock even in the very shallow subsurface. Only geophysical methods can understand the 3-D distribution of underground water and contaminator in the soil from the surface as well as geological structures.

We are applying the geophysical prospecting methods to the shallow subsurface survey that is inevitable for maintaining the infrastructure and geo-environment. The application includes;

- Prediction of a head of the tunnel face using seismic method,
- Detection of cavities located inside the river bank using shallow S-wave reflection method,
- Detection of buried pipes and estimation of its material properties using ground penetrating radar,
- Monitoring soil improvement treatment and environmental remediation using geophysical methods.

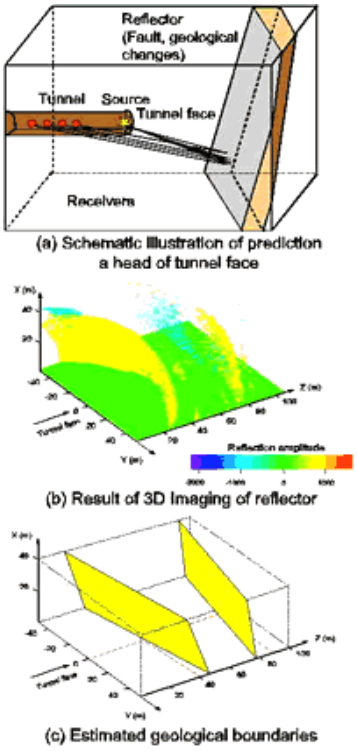


Figure 1 Geological boundaries imaged using seismic reflection survey of a head of tunnel face.

Figure 1 shows an application of seismic technique to prediction of a head of tunnel face. Two seismic reflectors imaged here show the geological boundaries. Using this information, we can predict the location, direction, dip and physical properties of sudden change of geological condition, prior to excavation.

Deep subsurface survey using geophysical prospecting methods for the exploration and the development of new energy resources

It is not too much to say that the fossil energy such as oil and natural gas does support the industrial development of the 20th and 21st centuries.

Without geophysical methods, we can never explore nor develop these energy resources located deep (over several 1000 meters) inside the Earth. Three-dimensional seismic reflection technique can visualize complicated 3-D subsurface structures such as faults and folds, understand the ancient sediment environment and reveal the complete history of the sedimentation.

We are applying the geophysical methods to a new challenging target for exploring and developing new energy resources. The target includes;

- Exploration and production monitoring of methane hydrate existing beneath the deep sea floor or the permafrost,
- Monitoring oil sand recovery during steam injection,
- Monitoring CO2 sequestration into coal seams and recovery and production of methane gas from the coal seams.

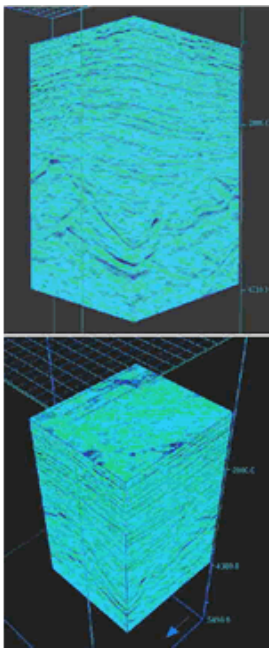


Figure 2　Data volume of subsurface structure obtained by 3-D seismic reflection method.

Figure 2 shows a 3-D data volume of subsurface structure obtained by 3-D seismic reflection method. We can extract any sections of interests and can calculate physical properties from the data volume.

Developing a high-resolution visualization technique of subsurface information (geotomography) and its application

Technologies such as X-ray CT and MRI in medical diagnostics can visualize a section or even a 3-D image of human body without cutting it. Geotomography is based on the same principle. Lots of sensors are arranged to encompass a target area. The measured data are processed by a extensive use of computers. Then we can obtain beautiful color images of the distribution of seismic velocity, attenuation characteristics and resistivity. Imaging 3-D distribution can also be possible.

We are studying geotomography techniques from the basic theory to the application to the following targets.

- High resolution imaging of fractured zone using waveform inversion technique,
- Monitoring the effects of environmental remediation treatment using resistivity tomography,
- Imaging 3-D distribution of a fault zone at a dam construction site using 3-D seismic tomography.

Figure 3 shows the 3-D velocity distribution obtained by using 3-D seismic tomography. The upper figure shows the velocity distribution of the volume encompassed by the 4 boreholes. The lower figure shows the 3-D distribution of the fractured zone in a rock mass at another site.

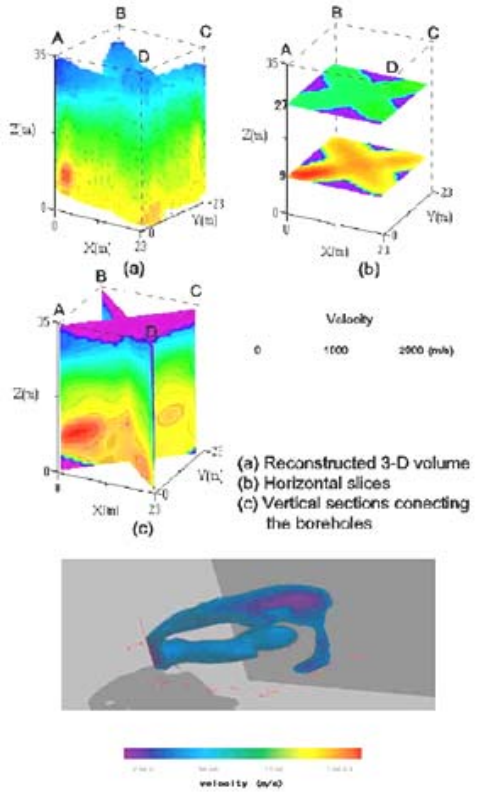


Figure 3 Three-dimensional velocity distribution obtained by using 3-D seismic tomography.

Engineering Geology Laboratory

Challenges to the problems related to 'human beings and the earth'

In the 21st century, the problems related to 'human beings and the earth', such as shortage of natural resources and energy, pollution of the environment and natural disaster, are getting extremely serious.

In addition, detailed knowledge on geology is vital in recent civil engineering for large-scale and cost-effective social infrastructures.

Engineering geology is, therefore, playing a major role, as a tool to solve such various problems related to 'human beings and the earth'.

Our laboratory of engineering geology is conducting research in various fields; exploration / development of natural resources and energy, preservation of the environment, disaster prevention and civil engineering.

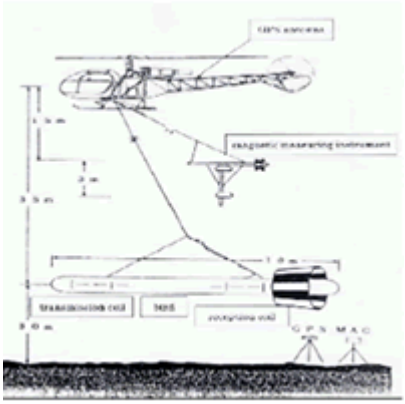


Figure 1 Airborne electromagnetic survey

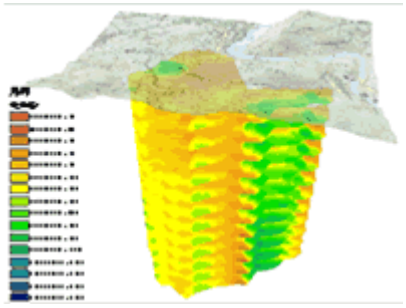


Figure 2 3D visualization of airborne electromagnetic data

3D visualization of geophysical data

Exploration geophysics and related information processing technology have been developed for exploration of natural resources. The aims of these techniques are to understand detailed geometry of subsurface structure, to combine the data with other information, and to extract useful information.

In order to obtain clear picture of geological information, 3D visualization technology needs to be developed.

Here we present our research on '3D visualization of airborne electromagnetic data using GIS'. Airborne electromagnetic survey is to understand 3D geometry of subsurface geological structures. The data can also be used for civil engineering and environmental engineering.

The colour pattern of the Fig.2 reflects weathering of soils and its thickness, thus can be applied to disaster prevention of the area when combined with GIS data including geography.

Exploration of offshore hydrocarbon resources

In the 21st century, shortage of natural resources and energy is getting extremely serious. In particular, oil fields are concentrated in limited areas, thus its price is sensitive to politics and economy. It is therefore important to explore non-oil energy sources.

Methane hydrate (MH) is a new possible natural resource. MH has been found in permafrost and in unconsolidated sediments of ocean floor, and its major distribution is identified in Nankai area. Seismic survey is generally useful to explore the offshore MH distribution.

Fig.3 shows characteristic Bottom Simulating Reflectors (BSRs), which suggest MH and its accompanying free gas (FG) layers.

We are conducting special research focused on MH exploration and estimation of reserves by using AVO(Amplitude Versus Offset) analysis.

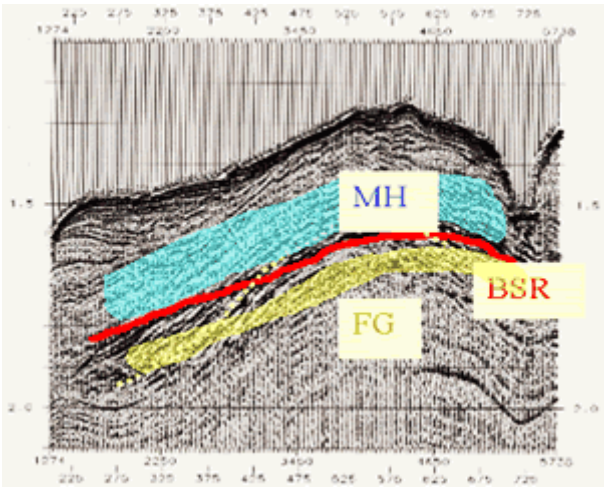


Figure 3 Characteristic Bottom Simulating Reflectors (BSRs) suggesting MH and its accompanying free gas (FG) layers

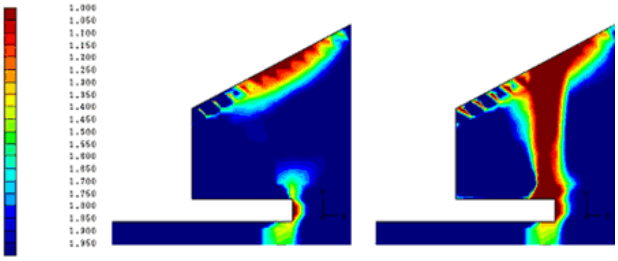


Figure 4 FEM simulation of slabbing

Slope stability of soft rocks

Soft rocks have special characters including low strength, large ductility, and easy degradation due to natural environment.

We are conducting research on understanding of soft rock characteristics and prevention of degradation. Here we present research on slabbing.

Slabbing is a type of mass wasting with a curved detachment surface due to erosion and degradation in a soft rock slope which initially does not include any discontinuity surfaces.

Slabbing commonly occurs where a high angle (over 60 degrees) slope is constructed in a soft rock. However, slabbing has not been widely recognized in Japan, and the phenomena has been regarded due to pre-existing discontinuity surfaces.

The collapse of Toyohama tunnel in 1996 could be an example of slabbing.

We are conducting research on slabbing mechanisms and also field survey to investigate the mass wasting in Japan.

Geo-Development Engineering Laboratory

Earth crust development technology supporting a continuous progress of human beings

For the continuous progress of human beings, new technologies to develop natural resources and to utilize and maintain underground spaces would be required considering the preservation of global environment.

In our laboratory, we try to develop such the new technologies, which can be applied to the difficult and various conditions, by synthesizing the knowledge of rock mechanics and the advanced technologies in the other fields. Moreover, we try to develop the technologies for the geological sequestration of nuclear waste and CO_2 and for the advanced utilization and maintenance of underground space such as underground research facilities, underground energy storage etc.

Rock support and its effect for the development of underground space

Rock support is very important especially for the excavation of very deep or very shallow underground space. This is because the stability of the space must be kept under the sever condition of stress and displacement. The rock support has been designed experimentally. Consequently, it has often been over designed. In order to perform the most effective rock support, therefore, investigation on the effect of rock support and its proper design based on an appropriate support theory is necessary. In this study, the effect of rock-bolting and tunnel face fore-piling have been investigated by theoretically and numerically.

Figure 1 shows the stress distribution around the two rock-bolts of fully glued type. From this figure, it can be seen that the compressive stress is generated between the rock-bolts. Since the rock-bolts are usually set around the space, it can be supposed that the compressive stress band is generated around the space. This compressive stress band would contribute to the stability of the space, since it has the effect to reduce loosened regions around the space.

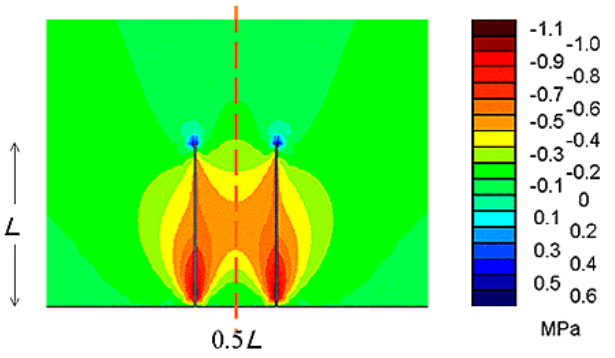


Figure 1: The stress distribution around the two rock-bolts of fully glued.

Study on the analysis of tunnel lining deformation and the optimization of detection system of tunnel lining deformation

Maintenance of tunnel lining is one of the important subjects. The deformation of lining is appeared at some tunnels, and this is a big problem. Therefore, it is necessary to estimate the lining deformation correctly and to take appropriate countermeasures. Moreover, it is important to make up a detection system of the lining deformation for the prompt effective measures. In this study, numerical analysis method of the lining deformation and optimization of the detection system using optical fiber is studied.

Figure 2 shows the result of numerical analysis of the countermeasures to a lining deformation. Countermeasure-I is composed from grout injection into the back space of the lining and rock-bolting at both side wall of the lining, and countermeasure-II is composed from rock-bolting at arch section of the lining and setting strut at bottom of the lining in addition to the measure-I. From this figure, it can be seen that these countermeasure can reduce the

convergence, and the effect of both countermeasures can be estimated.

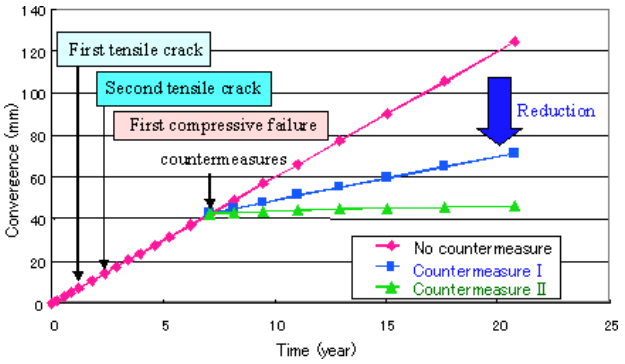


Figure 2: The time dependent convergence of a tunnel with a lining deformation

Underground storage of natural gas and geological disposal of CO2

Natural gas is relatively clean energy resource and its recoverable reserves are larger than the crude oil. Therefore, stockpiling of natural gas is important for Japanese stable energy supply in this century. Natural gas injection into depleted oil and gas reservoirs is planed as a method of the stockpiling. Moreover the reduction of CO_2 emission is an urgent problem that we must solve. To this problem, geological disposal is thought to be the most applicable solution method. For these problems, the correct evaluation of the diffusivity, injectivity and so on of gas-injected formation is very important. In this study, investigation of pore structure of the formation and the gas flow simulation using lattice Boltzmann method is performed to the pore structure model.

Figure 3 shows a pore structure model generated numerically.

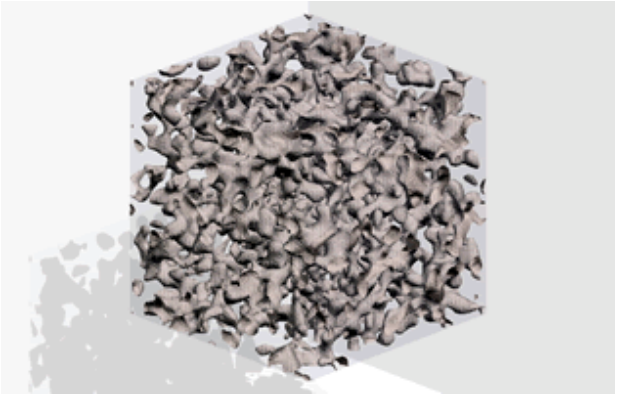


Figure 3: A pore structure model generated numerically

Geo-Mechatronics Laboratory

Measurement techniques and evaluation methods for the sustainable development of earth resources and energy

In our laboratory, based on the measurement techniques, relevant research field covers but not limited to:

1) Exploring (developing) the competent techniques to effectively and intentionally increase the exploitability of earth resources and energy;

2) Developing the non-destructive testing and evaluation (NDT&E) techniques to efficiently manage and utilize the resources which had been exploited already.

Development of innovative NDT&E techniques

It is difficult for the conventional NDT&E to detect the flaw/defect sensitively and accurately due to the lack of satisfied resolution. To overcome this problem, some innovated NDT&E techniques are under developing.

Total magnetic flux method for wire rope corrosion detection

For the testing targets with long axis, such as wire rope, suppose to be longitudinally saturated by a strong magnetic field, the external magnetic flux leakage (MFL) is well proportional to the internal flaw content. Based on this scheme, precise defect detection and characterization can be achieved. Design of this NDT system and the improved signal processing algorithm consist one of the research activities. (Figure 1)

Magnetostrictive ultrasonic method for wire rope flaw detection

Ultrasonic inspection are one of the popular NDT&E methods for internal flaw detection. However, it performs poor when the ultrasonic transducer can not be directly installed. This problem can be avoided by using the magnetostrictive ultrasonic NDT method if the target to be tested has high magnetism. One example is shown as Figure 2.

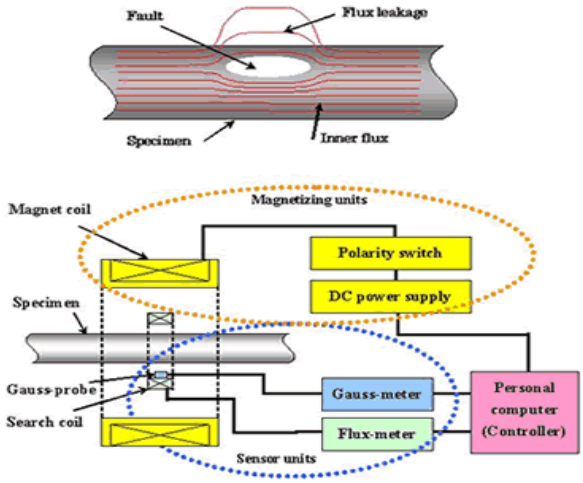


Figure 1: Illustration of the relation between flaw and MFL (top part), and schematic of total-magnetic-flux-based measurement system (bottom part).

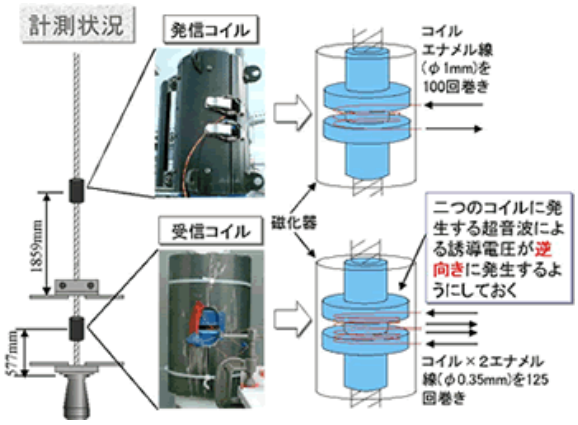


Figure 2: Schematic of measurement system based on magnetostrictive ultrasonic NDT method

Fundamental research on NDT&E techniques

In addition to the development of innovated NDT&E, it is necessary to improve the conventional techniques by designing sensitive and precise NDT&E system and integrating advanced signal processing algorithms. Aiming at this objective, relevant research activities are carried out, including but not limited to:

Study on initial variable estimation and solution to the inversion problem

The internal conductivity distribution of the material to be tested can be estimated from the electric potential when current propagates inside the material. However, the relation between them is nonlinear. The reliability of the inversion solution mostly depends on the initial model. In our laboratory, relatively simpler methods are being developed to build an effective initial model. Figure 3 presents such an example.

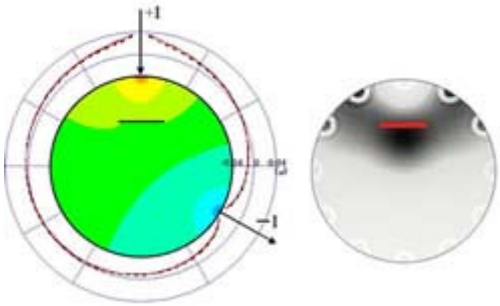


Figure 3: An example: Electrical potential distribution of a circular-shape plate with one crack and its image obtained by Back-projection method.

Study on precise measurement and evaluation of ultrasonic wave velocity dispersion

To detect and characterize the internal flaw, ultrasonic wave performs better that most other wave techniques do. Therefore, it is important to well understand the various properties of wave, especially the relation between frequency and propagating velocity. This consists one of the current research sub-field.

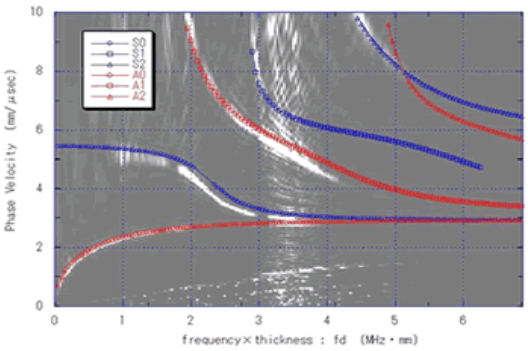


Figure 4: Experimental result of the relation between frequency and propagation velocity of various Lamb waves, and the theoretical computation.

Study on signal processing and fusion based on multiresolution analysis (MRA) method

No single NDT method can fully assess the structural integrity of a material. The use of more than one NDT techniques can capture better understanding and result. Information of interest from different data sources distribute at different resolution levels. By multiresolutionally decomposition, the dominant features from various source data are highlighted at corresponding sales, so that data fusion can be applied to achieve a more precise interpretation and characterization of the material. Figure 5 gives an example of multifrequency eddy current fusion result of a specimen with two cracks in both surfaces.

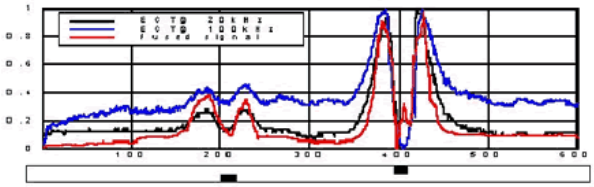


Figure 5: Data fusion result from multi-frequency eddy current testing for a plate with two cracks.

Studies on operating and management system development for large-scale transportation machine

Monitoring system for long and massive winding machine used for inclined shaft (Figure 6)

Inclined or vertical shafts act as the necessary access to exploit the underground earth resources and to utilize the underground environment. Wire rope is used by nearly all of the massive winding machine. One of our research fields is carried out to build the management and monitoring system for such a massive machine.

Figure 6: The worldwide longest winding machine for inclined shaft with length of 7,000m. (provided by Kusio Colliery)

Erosion and Sediment Runoff Control Laboratory

Technology controlling sediment in mountain-river-coast systems in order to create fluvial areas that maintain safety and fundamental environment

Primal objective of sediment control operations is to prevent and decrease damages from sedimentation disasters, and the development of techniques contributing to this objective is necessary. On the other hand, it is also essential matter to maintain fundamental conditions of fluvial ecosystem, consisting of water, sediment and aquatic lives. Therefore, it is necessary for us to make efforts in finding a way to control the sediment in sediment transport systems so as to satisfy both of these two extreme objectives.

In our laboratory, we are developing methods predicting and decreasing damages from sedimentation disasters, and methods evaluating impacts of sediment transport on ecosystem, from two main standpoints of "disaster prevention" and "environment".

Sediment management in mountain-river-coast systems

As controls of sediment in mountain-river-coast systems, anti-sediment treatments on production areas, sabo dams, and a system of sediment flushing from reservoirs are major tools. Functions of these tools are being investigated not only from a viewpoint of sediment hydraulics but also from a viewpoint of fluvial environments.

As an example of these studies, an evaluation method for impacts of sediment flushing from reservoirs on fishes is being developed. By modeling the processes of changing habitat due to sediment deposition, anoxia and die due to turbidity after sediment flushing, the evaluating method is constructed. Figure 1 shows a relationship between concentration of turbidity, exposed duration and survival ratio of fishes.

As the other topics, evaluation method of sabo dam functions, development of new type sabo dams, study on habitat environment of fishes from a viewpoint of sediment transport, and development of a model analyzing riverbed change as a control of sediment are now focused.

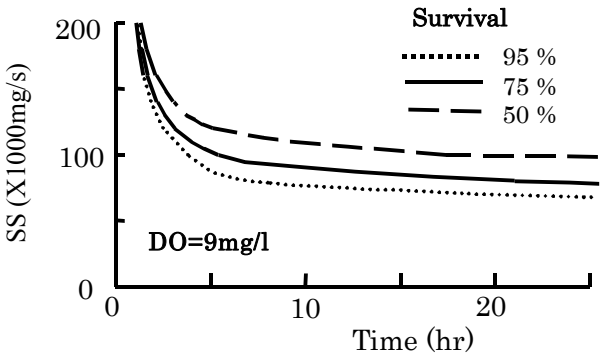


Figure 1 Relationship between concentration of turbidity, exposed duration and survival ratio of fishes.

Monitoring sediment routine in mountainous watershed

Understanding sediment routine in mountainous watershed is important for the sediment management in mountain-river-coast systems. However, it is difficult to evaluate timing, location, and amount of sediment production and runoff along headwaters.

We are now developing a new method estimating the timing and amount of sediment productions by means of monitored turbidity that is closely related to the sediment production and runoff, and tracing sediment transport through numerical model calculations.

This study topic is being carried out based on field observations in Hodaka Sedimentation Observatory located on Okuhida Spa Resort, Gifu. Figure 2 shows an example of a relationship between flow rate, turbidity, and precipitation measured in a watershed. By these continuous measurements, it will be possible to record the sediment transport phenomena.

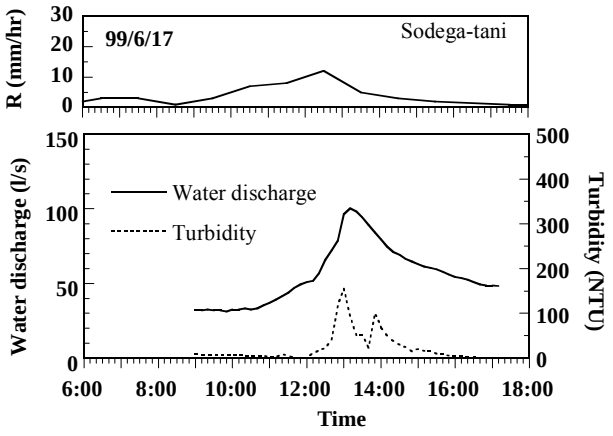


Figure 2 Changes of precipitation, flow rate, turbidity in a watershed, during a rainstorm event.

Understanding and predicting sediment production in mountainous areas

In mountainous areas, sediments are generally produced by freeze-thaw effect or slope failures during rainstorm. The production of sediment is not only a starting point of sediment dynamics in sediment transport systems but also a cause of serious disasters. In this sense, it is necessary to understand the process of sediment production and to develop a method predicting its amount and timing.

As an example, we are developing a new method to predict amount of the sediment produced though the freeze-thaw effect, which is one of the dominant causes of sediment production, by means of monitored air temperature, soil temperature, soil water content, and measured soil properties.

Recently, it is pointed out that preferential water flow through soil pipes in hillslope soils might influence occurrence of slope failures. We are now investigating morphological structure, hydrological effects on rainwater flow within the soil profile, influence on slope stability and occurrence of debris flow by clogging and opining, of soil pipes.

Figure 3 shows changing distributions of soil water pressure within hypothetic hillslope soil profiles, which include a full slope length soil pipe in one case (a), and a pipe clogging close to downslope end in the other (b), obtained through numerical model simulations. These simulation results indicate that the soil pipes greatly influence the soil water response to rainfall.

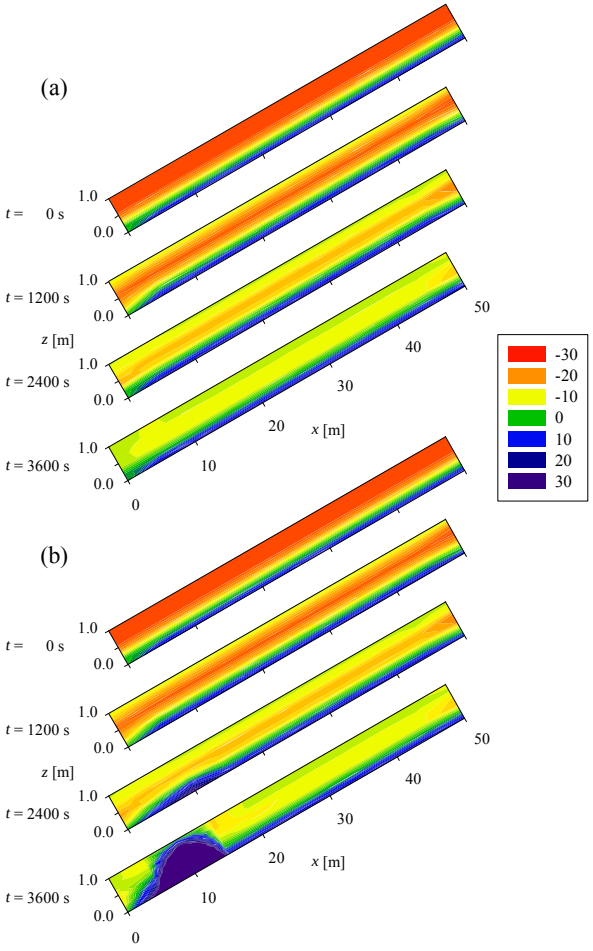


Figure 3 Changing distributions of soil water pressure within soil profiles obtained through numerical model simulations (a: a full slope length soil pipe, b: a pipe clogging close to downslope end).

Hydroscience and Hydraulic Engineering Laboratory

Integration for Flood Protection/Mitigation and Ecology Management

Research fields covered by this group are most of water-caused and water-related disasters such as floodings of water and sediment, debris flows, storm surges and tsunamis. Mechanisms of these disasters and their prevention/mitigation schemes are studied both in laboratory experiments and in field observations.

Fundamental research in hydroscience and hydraulic engineering is also conducted, particularly taken recent ecological/environmental matters into account. Experiments are carried out at the Ujigawa Open Laboratory being full use of flumes, basins and hydraulic models of various sizes and scales. Computational models are also developed and utilized for better understandings and prediction of the phenomena.

Three dimensional structure of flood flow and bed form

Flood flow in a river has a three dimensional structure and vortex and secondary flows are observed in this flow. Study on the three dimensional structure gives basic information about problems concerning water engineering and water-related disasters, e.g. flow resistance, disaster-causing mechanisms etc.

Flows in straight channels of rectangular/trapezoidal cross-section and compound cross-section have been investigated by making full use of measuring devices like laser Doppler velocimeter, water-level meter, pressure meter and so on. Flow visualization techniques have also been used to obtain an instantaneous feature of the flow field with the aid of hydrogen bubbles, plastic beads and dye. Relation between the flow structure and bed form has been studied in a compound meandering channel and it is found that the secondary flow makes an important role in the erosion and deposition on the bed.

Recently, experiments on complex flows around constriction and groyne have been performed, the complicated structures are clarified by using the precise data obtained by velocity measurements and PIV method.

Hydraulics on inundating flow and design flooding

Recently, the comprehensive flood control measures to disperse inundation areas and minimize flood damage by flowing into design flooding areas through open dykes and fuseplug levees have been submitted. Field surveys and experimental investigations are conducted to elucidate the hydraulics on inundating flow and design flooding.

The flooding in the Yosasa river in Tochigi Prefecture on August 26, l998 that exceeded design flood is investigated on the results of field survey and experimental investigations are conducted on typical hydraulic phenomena.

On the Katsura river in Kameoka city and the Yura river in Hukuchiyama city which have the flood control measures by flowing into design flooding areas through open dykes and groves in the floodplain, the field surveys on inundation and experimental investigations are conducted. Through these studies, the role of traditional flood control measures is discussed.

Observations and experiments of sediment transport phenomena

Imbalance of sediment transport in time and space generates sediment disasters. In a mountainous area, rapid mass movements such as a debris flow, pyroclastic flow, mudflow, slope failure, and etc. occur due to heavy rainfalls, volcanic activities, earthquakes, and etc., while comparatively slow sediment transport phenomena such as

sedimentation in sabo dams and reservoirs, river bank erosion, local scouring around piers, and etc. also occur, resulting in sediment disasters. Mechanisms of these sediment transport phenomena are investigated not only by the observations and physical model experiments but a[so by mathematical modeling.

Numerical simulation models are also developed in order to predict the phenomena and to establish the effective countermeasures against sediment disasters. Movable bed physical model experiments such as river course maintenance for navigation in the Yodo River have been carried out. Optimal shape of groynes and their arrangement are investigated. Methods to Delineate the sediment hazard prone area have been developed by using numerical simulation models. Efficacy of the sabo works such as sabo dams and channel works is investigated by using numerical simulation methods.

Observation and simulation on the flow mechanism in coastal region

In recent years there has been increasing interest in environmental problems in bays and coastal areas. As the basics to treat various processes occurring in those areas from physical/chemical/biological aspects, it is of great importance to clarify hydraulic behavior in these areas. In this research section, hydraulic behavior in coastal region is studied by some hydraulic and numerical models or field observations. Hydraulic model tests on the tidal currents in Bay areas have been carried out with flow visualization technique, and observational investigations on the flow mechanism have executed at the observational facilities continuously. Numerical simulation models such as driftwood motion have been developed by using Lagrangian-Eulerian coupling model in consideration of both tidal currents and wind.

Interdisciplinary hydraulics - Ecology and Hydrodynamics –

One of the most important issues in today's hydraulics lies in an interdisciplinary area between ecology and hydrodynamics. It is no doubt that we must hand all water and water-related areas in a good, or better if possible, condition over to the next generations. Now it has gradually been known that a flow field possessing "complexity"* and "variety"** provides preferable environment. However, from the viewpoint of flood defense, such a flow field may not always be accepted. It has not yet been established a balanced solution between ecological management and flood alleviation scheme. As an example of such a flow field our group pays attention to groyne fields. Flow pattern and sediment movement in groyne fields are studied both in laboratory experiments and in field observations. The obtained data not only give basic information but will lead a new solution and design prospects for such flow fields.

*complexity of geometry, flow pattern, stage variation, etc.

**variety of water depth, sediment material and size, vegetation, etc.

Geotechnics for Hazard Mitigation Laboratory

Towards advancement and application of geotechnics for hazard mitigation in urban area

Rapid development of urban areas originated from plains and lowlands towards hills in the suburbs poses increasing risks in geo-hazards. The potential geo-hazards include soil liquefaction during earthquakes, collapse of artificial cut-and-fill, and slope instability. A series of strategic measures are required for mitigating these geo-hazards and establishing higher performance of geotechnical works.

Various approaches are adopted for achieving these objectives, such as nonlinear effective stress analysis of soil-structure systems constructed on saturated sandy deposits, global modeling of geo-hazards based on the use of GIS and urban geo-data base, experimental studies through geotechnical centrifuge.

Damage estimation of soil-structure systems during large earthquakes

More than 6000 people were killed and destructive damage on infrastructures, such as lifelines, bridges, and port facilities, were trrigered by the 1995 Hyogoken-Nanbu, Japan, Earthquake. Among these damaged infrastructures, soil- structure systems, such as wharves and/or bank protection around reclaimed land and river dykes, suffered catastrophic damage mainly due to soil liquefaction. The damage was also severe in terms of restoration period and its cost. Therefore it became socially imperative to estimate the degree of damage on these structures after earthquakes with higher accuracy.

To analyze and estimate the damage, the computer program called FLIP has been developed. The FLIP is an FEM program for the effective stress analysis with multiple shear mechanism of sands. It has been used to analyze and estimate the degree of damage on various infrastructures. Figure 1 shows a result of the analysis for the Kobe Bridge which suffered severe damage after the Hyogoken-Nanbu Earthquake.

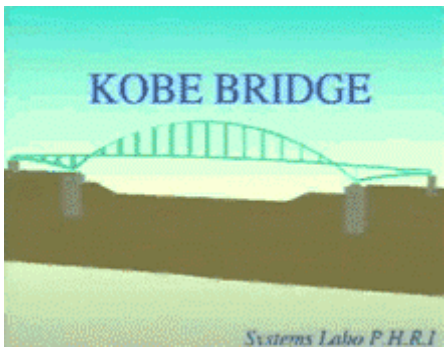


Figure 1 Analysis of the Kobe Bridge during the Hyogoken-nanbu Earthquake: Red indicates high pore water pressure.

An assessment and modeling of long-term time dependent settlement of the quasi-overconsolidated structural Pleistocene marine clay

Long-term time dependent settlement due to reclamation work has occurred in the quasi-overconsolidated structural Pleistocene marine clay deposits in Osaka Bay. The most difficult problem is that the delayed compression of those clays continues even when the total overburden remains less than pc derived from the oedometer tests. A series of long-term consolidation tests is carried out to assess the property of the quasi-overconsolidated Osaka Bay Pleistocene clays. The experimental results clearly show the time-dependent behaviors even in the overconsolidated region and that the apparent overconsolidation behavior disappears with the reduction in strain rate. A new procedure is introduced to describe the above-mentioned delayed compression of the quasi-overconsolidated structural clays. An elasto-viscoplastic behavior is assumed to occur even when the applied stress

remains less than pc derived from the oedometer tests. A series of numerical analyses in terms of the elasto-viscoplastic finite element method is conducted to simulate those time-dependent behaviors. The calculated performance can well describe the laboratory experimental results of the oedometer tests. Furthermore, the procedure is also applied to the long-term deformation that has been monitored at the Maishima Reclaimed Island in Osaka Bay. The calculated results can also well describe the monitored long-term settlement of the each Pleistocene marine clay layers.

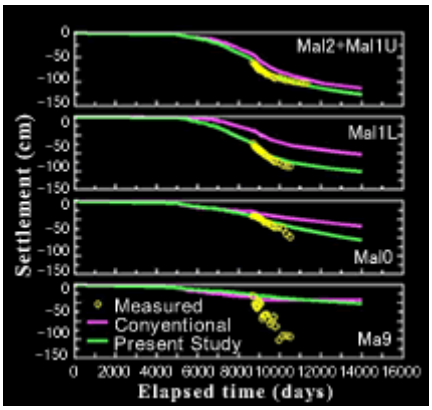


Figure 2 Observed and computed settlements of Pleistocene marine clay layers

Centrifuge experiments on the seismic behavior of group pile foundations

Pile foundations in saturated sand deposit are quite often encountered for structures constructed on reclaimed lands and/or port facilities. After the 1995 Hyogoken-Nanbu, Japan, Earthquake, failures of pile foundations in saturated sand deposit have been reported and regained an increasing attention for subjects of design and research.

The possible causes of these failures might be the lateral force by the lateral movement of soils due to liquefaction, and/or inertia force of super-structures and soils around foundation during shaking. Failure of pile foundations severely affects the usability of structures, therefore it is important to understand the failure mechanism of pile foundations in liquefied ground to improve their performance against seismic forces.

We have investigated the causes of these failures using the geotechnical centrifuge (Figure 3) and observed the interaction between structures and surrounding soils.

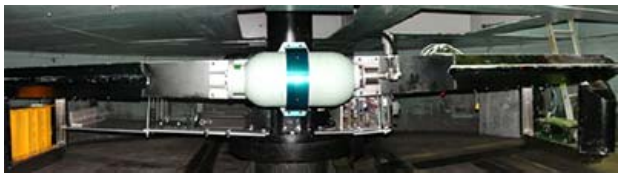
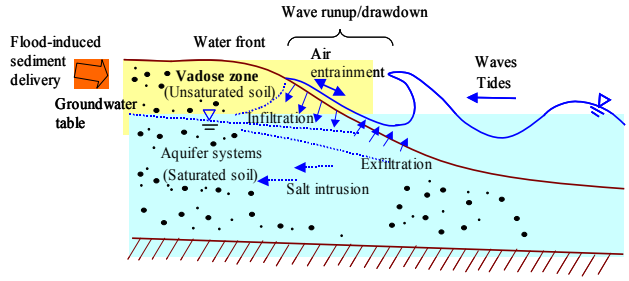


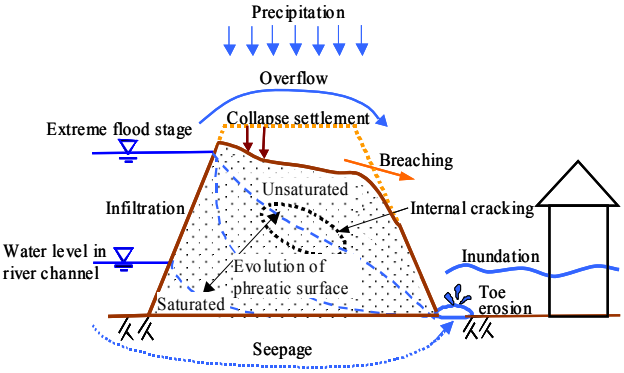
Figure 3 Geotechnical centrifuge at DPRI (Radius=2.5m)

Waterfront and Marine Geohazards Laboratory

The Dynamics of complex geo-fluid systems: a frontier in natural disaster sciences

This laboratory promotes studies of risks and consequences of sediment-related, geological hazards which involve the following: the weathering into and flow out of structurally unstable sediments on sloping terrains; liquefaction of loosely packed sediments in low-lying waterfront areas; swash-zone sediment transport; hydro-geodynamical processes in seabed sediments; submarine landslides; and slide-induced tsunamis. The research efforts have emphasized the importance of a full understanding of the nature and geomorpho-dynamics of sediment delivery systems that connect river basins, estuaries and coastal oceans. One of the most challenging aspects arise from complex fluid-sediment interactions. Also, this reasoning applies to the integrity of water-defence soil structures such as river levees under extreme environmental forcing.





Research Projects Focusing on Geo-environmental Hazards in Waterfronts

Perspectives

Waterfronts are one of the Earth's richest yet most vulnerable environments. In fact, many of densely populated, thriving cities worldwide have developed in river deltas where the land meets the sea. Such waterfronts provide people with fertile soil, potable water, access to marine transportation and a variety of natural resources. The ever increasing rate of urbanization has made the waterfront areas even more vulnerable to natural hazards, owing to their geomorphological and geological setting: low-lying lands composed of unconsolidated sediments that endlessly are exposed to natural forcing such as floods, storm surges, waves, tides, earthquake shaking and tsunamis. Also, there has been increased awareness of the preciousness of the waterfronts. In order for the human activities in the waterfronts to be sustainable, more attention should be paid to the exquisite balance and interactions of thermohydrodynamic, sedimentary and biological processes that operate there.

Research themes

The above-mentioned forms the very basis that has directed our research efforts on complex fluid-sediment interactions in waterfront areas. The related research themes include the following:

1. Integrity of water-defence soil structures, such as river levees and reservoir embankments, under extreme environmental forcing
2. Wave-soil interactions and related seabed and swash-zone processes
3. Tempo-spatial structure of sediment delivery systems in estuaries and coastal oceans
4. The dynamics of submarine landslides, turbidity currents and slide-induced tsunamis.

The challenging aspects of the research themes

reflect the highly nonlinear nature of soils when they are exposed to severe, dynamic environmental forcing. More specifically, soils' intriguing characteristics may be identified through the following descriptions:

- particulate
- porous
- multi-phased
- interfacial
- multi-scaled.

All of these features combined make the dynamics of fluid-soil systems a challenging field of sciences and call for an integrated approach so as to solve real-life problems that occur in the waterfronts.

Approaches

In order to tackle the research themes described above, we have brought together the following three approaches:

- Exploratory physical modelling
- Cutting-edge numerical analysis
- Strategic field observations.

The centrifugal wave testing developed by our research group (Sekiguchi et al., 1998) has proven effective and useful in facilitating insights into the wave-soil interaction. The findings obtained include the differences in the resistance to liquefaction of loosely packed sand beds under travelling and standing wave trains (Sassa and Sekiguchi, 1999; 2001); progressive nature of wave-induced liquefaction in a given sand bed (Sassa, Sekiguchi and Miyamoto, 2001); and progressive solidification under continued wave loading that transforms liquefied soil into a solid with densest packing (Miyamoto, Sassa and Sekiguchi, 2002).

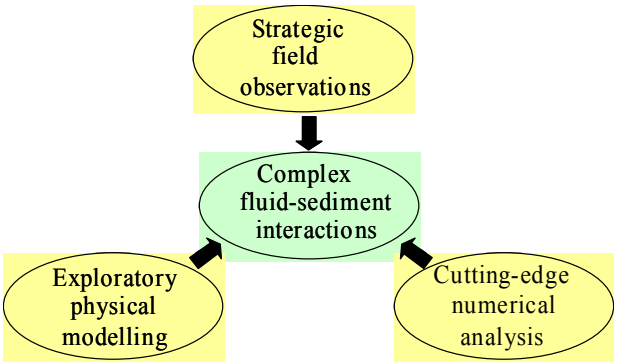


Figure 1 Approaches to tackle the complex fluid-sediment interactions.

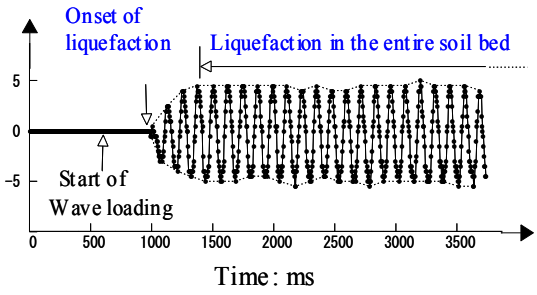


Figure 2 Vertical movement of the soil surface in the course of progressive liquefaction.

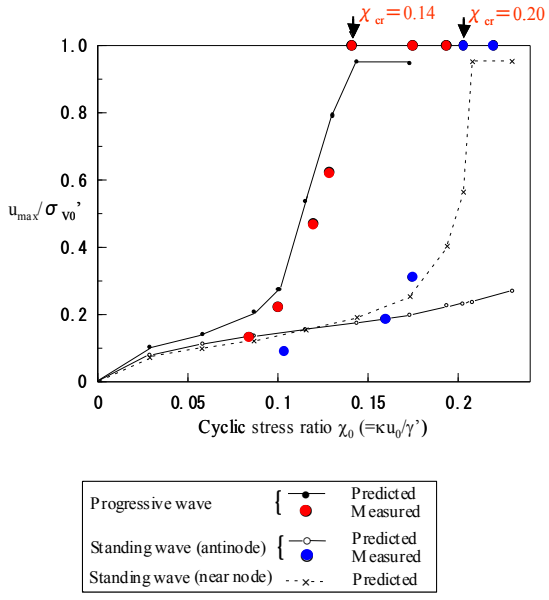


Figure 3 Comparison of predicted and measured relationship between maximum residual pore pressure ratio and cyclic stress ratio.

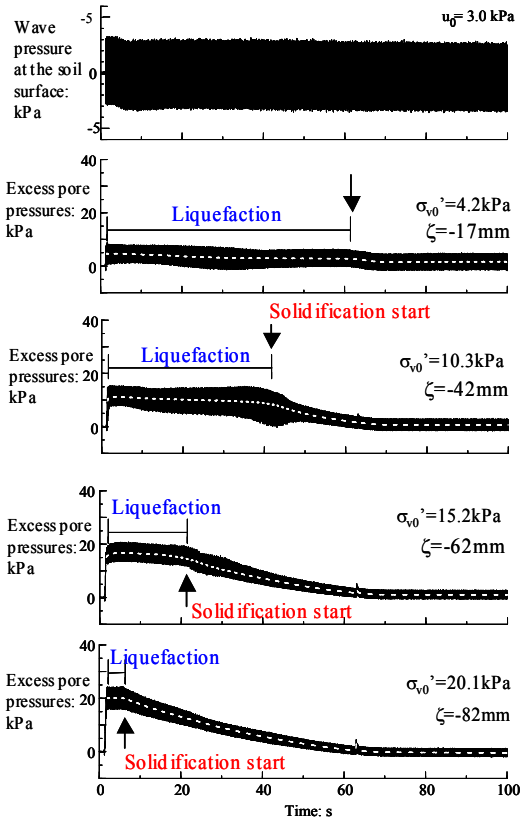


Figure 4 Liquefied soil gradually transformed into a solid in the course of continued wave loading

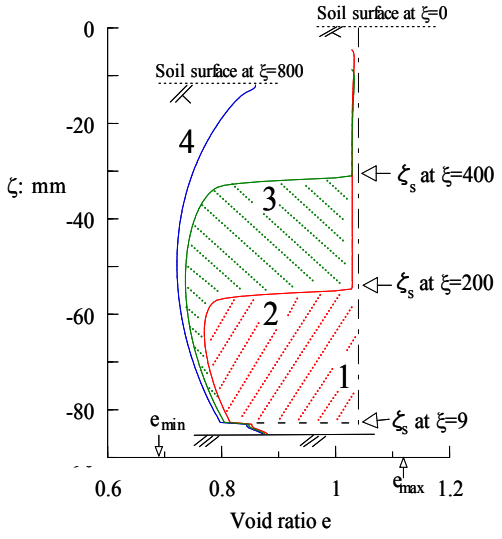


Figure 5 Predicted evolution of densification front in association with progressive solidification.

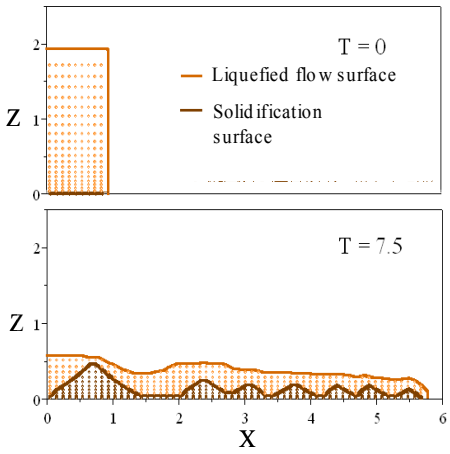
The discovery of the progressive solidification in otherwise fluid-like soil led us to re-examining the constitutive modelling of liquefied soil and to proposing an analysis procedure in which liquefied sediment flow may be consistently modelled (Sassa, Miyamoto and Sekiguchi, 2003). The analysis code developed (LIQSEDFLOW) has a potential for dealing with the following processes as well: turbidity current following submarine landsliding; degradation and flow out of a river levee slope due to overflowing water; and swash-zone sediment transport.

The progress in numerical modelling has recently prompted us to designing a range of new experimental programs that focus on fluidization of sediments under forced seepage flows as well as on high-density turbidity currents following underwater slope failures.

Field observations in waterfronts have been put forward, in collaboration with a governmental office, regarding suction and moisture changes in a beach of gravelly sand due to tidal fluctuations (Sassa, Li and Sekiguchi, 2003). The states of suction in unsaturated granular soils in waterfronts have been less explored despite their profound practical implications, eventually making the data set obtained very useful. The experience gained has also led us to designing strategic field observation programs that aim to explore the performance of soil structures subjected to unsteady infiltration conditions.

Also, there are a number of situations in waterfronts where strategic field observations are critically needed. Air-borne laser-scanning technology is an effective means that facilitates high-resolution measurements of geomorphological changes in natural sedimentary products, such as sand bars at river mouths, tidal flats and sand beaches. Integration of such advanced technology with cutting-edge numerical analysis of sediment mobility will certainly be a target which we should like to aim at in the near future.

(a)



(b)

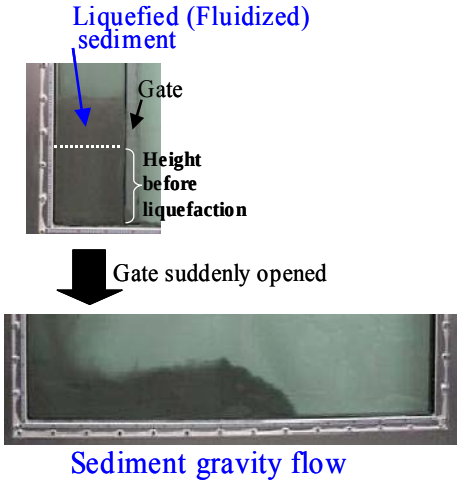


Figure 6 Turbidity current following underwater slope failure: (a) Prediction using LIQSEDFLOW; (b) Experiment .

Computational Mechanics Laboratory

Understanding the essence of mechanical phenomena through high performance computing

Computational mechanics is one of powerful approaches of mechanics, along with theoretical and experimental mechanics, which investigates mechanical phenomena through computer simulations.

This laboratory formulates and implements various approaches of the Boundary Integral Equation Method (BIEM), which is one of major techniques of computational mechanics and is considered suitable for the analyses of phenomena such as waves, fracture, etc. We are currently interested in fast BIEMs and their applications to non destructive evaluations. In addition, this laboratory is doing research on the development of numerical models for predicting the urban heat environment and their applications to urban planning.

Research on Boundary Integral Equation Method

The Boundary Integral Equation Method(BIEM) is a highly accurate technique of computational mechanics, which makes it possible to determine the states within a body through an analysis carried out only on the boundary. This method is said to be suitable for the analyses of wave problems such as earthquake, ultrasound, etc. and of fracture phenomena. Recent major issues of BIEM include applications to large scale problems.

Ordinary BIEM requires improvement of the efficiency since the complexity of building up the coefficient matrix is proportional to the square of the number of unknowns.

The Fast Multipole Method (FMM), which is said to be among the top 10 algorithms of the last century, has been found to make this improvement possible. Indeed, with the help of the FMM accelerated BIEM, a desktop PC will be sufficient to solve problems of the sizes as large as would require computers of the world's largest class with other conventional methods. We are now investigating applications of this method to problems of elastostatics/dynamics, acoustics, etc. Fig.1 shows the response of cavities in an elastic space to an incident wave.

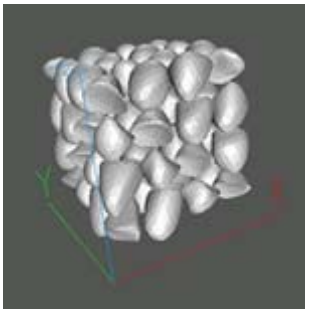


Figure 1 Response of cavities in an elastic space to an incident wave obtained with the fast multipole BIEM.

Research on non destructive evaluation using ultrasound and laser measurement

Techniques to detect small defects are important in evaluating the safety of structures. Especially important is the ultrasonic testing which is safe and practical. Unfortunately, however, only a small part of the abundant information of the ultrasonic measurement is used in practice because the output of ultrasonic transducers used in the ultrasonic testing is hard to interpret physically.

Hence in our laboratory, we measure the particle velocities of ultrasounds with a laser interferometer to analyze the characteristics of the ultrasonic transducer and then utilize the results in a quantitative ultrasonic nondestructive evaluation of determining the shapes and locations of defects.

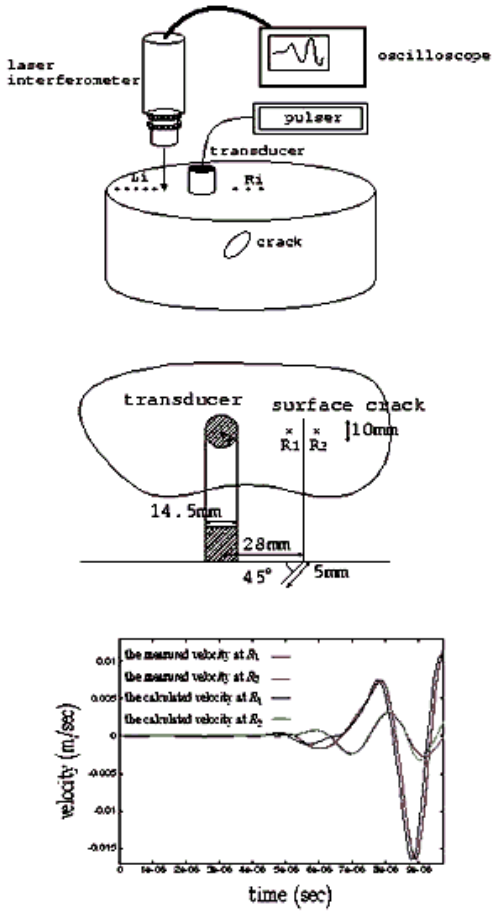


Figure 2 Scattered waves from a surface crack. Comparison of the real data of the laser velocimetry and the simulated results.

Development of models for predicting the urban heat environment and their applications to urban planning

Recent urbanization is accelerating the warming of urban area. In the temperate regions, it damages the urban thermal environment especially in summer. The greenimg of a city is effective to ameliorate the urban thermal environment. However, with the current state of technology, it is impossible to quantitatively estimate such amelioration due to vegetation. A model simulating the thermal balance within vegetation is required as one of the preliminary stages in order to evaluate the effect of vegetation on the urban thermal environment.

Fig. 3 shows the simulation result of the temperature reduction by a single model tree. It is seen that the air temperature lowers within the tree and in the wake of it due to transpiration from the leaves. Fig. 4 shows the computational result of carbon dioxide fixation by photosynthesis of the leaves within the tree.

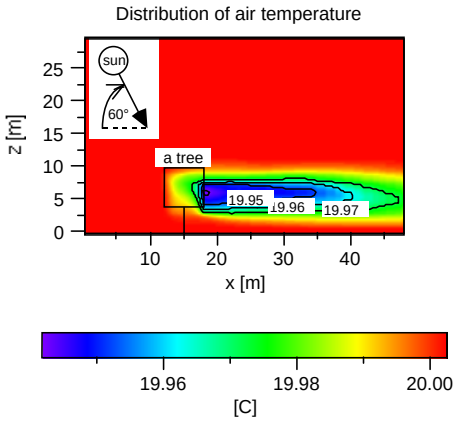


Figure 3 Result of a simulation of the temperature around a tree

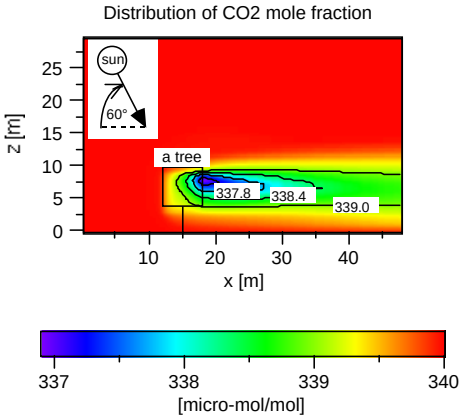


Figure 4 Result of a simulation of CO_2 density distribution around a tree

International Conferences Organized by Faculty Staffs

Year of 2004

Second International Conference on Bridge Maintenance, Safety and Management, Oct. 19-22, 2004, Kyoto, Japan

Chairman:	Eiichi Watanabe
Secretary General:	Tomoaki Utsunomiya

2nd Workshop on Durability of Post-Tensioning Tendons, Oct. 11-12, 2004, Zurich, Switzerland

Coordinator:	Toyoaki Miyagawa

The 8th International Symposium on Recent Advances in Exploration Geophysics in Kyoto (RAEG2004), March 10, 2004, Kyoto, Japan

Chairman:	Yuzuru Ashida
Program Committee:	Toshifumi Matsuoka
	Tsuyoshi Sugano
	Isamu Hirano
Conference Committee:	Yoshinori Sanada
	Yasuhiro Yamada

International Symposium on Methane Hydrates and Fluid Flow in Upper Accretionary Prisms, March 9, 2004, Kyoto, Japan

Chairman:	Toshifumi Matsuoka
Secretary General:	Yasuhiro Yamada

Year of 2003

8th Int. Conf. On Inspection, Appraisal, Repairs and Maintenance of Structures, Dec. 18-19, 2003, Singapore

Coordinator:	Toyoaki Miyagawa

NCST-Japan Joint Workshop on Rock Engineering, Nov. 21-22, 2003, Hanoi, Vietnam

Conference Chairs	Yuzuru Ashida
Conference Co-Chairs	Yasuhiro Yamada, Yoshinori Sanada

International Workshop on Prediction and Simulation methods in Geomechanics, Oct. 14-15, 2003, Athens, Greece

Chairman:	Fusao Oka

The 30th IAHR Congress, Thessaloniki, Greece, August 24-29, 2003

Editor of Proceedings:	Iehisa Nezu

Challenges to the Sedimentation Management for Reservoir Sustainability, Session of The Third World Water Forum, March 21, 2003, Ohtsu-Shiga, Japan

Chairman:	Tetsuya Sumi

The 1st Kyoto International Symposium on Underground Environment (The 1st UE Kyoto), March 17-18, 2003, Kyoto, Japan

Organizing Committee	Chairman	Toshiaki Saito
		Kenji Aoki
		Yuzuru Ashida
		Koichi Hanasaki
		Toshifumi Matsuoka
Program Committee	Chairman	Toshiaki Saito
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		Kazuhiko Tsukada
Secretary General		Sumihiko Murata

The 7th International Symposium on Recent Advances in Exploration Geophysics in Kyoto (RAEG2003), Jan. 27-28, 2003, Kyoto, Japan

Chairman:	Yuzuru Ashida
Program Committee:	Toshifumi Matsuoka
	Tsuyoshi Sugano

The 6th SEGJ International Symposium, Jan. 22-24, 2003, Tokyo, Japan

Technical Program Subcommittee Toshiki Watanabe

Year of 2002

EIT-Kyoto University-AIT Joint Workshop on Development of Rock Engineering: Japan and Thailand, Nov. 16, 2002, Bangkok, Thailand

Organizing Co-Chairs Yuzuru Ashida

NCST-Kyoto University Joint Workshop: Japan and Vietnam, Nov. 11, 2002, Hanoi, Vietnam

Organizing Co-Chairs Yuzuru Ashida

1st fib Congress, Oct. 14-18, 2002, Osaka, Japan

Coordinator: Toyoaki Miyagawa

International Workshop on Bifurcations and Instabilities in Geomechanics, IWBI, June 2-5, 2002, Minneapolis MA, USA

Scientific Committee: Fusao Oka

The 6th International Symposium on Recent Advances in Exploration Geophysics in Kyoto (RAEG2002), Jan. 28, 2002, Kyoto, Japan.

Chairman: Yuzuru Ashida

Program Committee: Toshifumi Matsuoka

Year of 2001 and before

The Fourteenth KKNN Symposium on Civil Engineering, Nov. 5-7, 2001, Kyoto, Japan

Coordinator: Eiichi Watanabe

Modern Tunneling Science and Technology, IS-KYOTO, Oct. 30-Nov. 1, 2001, Kyoto, Japan

Organizing Committee: Fusao Oka

The Fifth Asia-Pacific Conference on Wind Engineering, Oct. 21-24, 2001, Kyoto, Japan

Chairman of Organizing Committee: Masaru Matsumoto

Secretary General: Hiromichi Shirato

The 5th SEGJ International Symposium, Jan. 24-26, 2001, Tokyo, Japan

International Relations Subcommittee Toshiki Watanabe

Advisory Members Toshifumi Matsuoka

The 5th International Symposium on Recent Advances in Exploration Geophysics in Kyoto (RAEG2001), Jan. 22, 2001, Kyoto, Japan.

Chairman: Yuzuru Ashida

Program Committee: Toshifumi Matsuoka

International Workshop on Bifurcations and Localization Theory in Geomechanics, Nov. 29-Dec. 2, 1999, Perth, Australia

Scientific Committee: Fusao Oka

The Seventh International Conference on Structural Safety and Reliability, Nov. 24-28, 1997, Kyoto, Japan

Secretary General: Masaru Matsumoto

The International Colloquium on Bluff Body Aerodynamics and Its Applications, Oct. 17-20, 1988, Kyoto, Japan

Secretary General: Masaru Matsumoto

International Programs and Activities

ACADEMIC EXCHANGE MEMORANDUM

Kyoto University has concluded the GENERAL MEMORANDUM for academic exchange and cooperation with 57 universities, two unions of universities and one consortium of 18 universities and institutes, as indicated below.

The general memorandum encourages the following activities:

1. Exchange of scientific materials, publications and information
2. Exchange of faculty members and research scholars
3. Exchange of students
4. Joint research and meeting for research

Agreement made between Universities

(As of January 1, 2004)

Countries		Universities	concluded
Australia		University of Queensland	1981
Australia	■	University of Melbourne	1997
Australia	■	University of New South Wales	1998
Australia	■	University of Sydney	1999
Austria	■	University of Vienna	1993
Belgium	■	Université catholique de Louvain	1997
Canada	■	University of Toronto	1991
Canada	■	La Conférence des Recteurs et des Principaux des Universités du Québec	1994
Canada		University of Waterloo	2003
China, P. R.		Northwest University(西北大学)	1980
China, P. R.		Wuhan University(武漢大学)	1980
China, P. R.		Peking University(北京大学)	1983
China, P. R.		Tsinghua University(清華大学)	1998
China, P. R.		Fudan University (復旦大学)	2002
China, P. R.		Zhejiang University(浙江大学)	2003
Czech		Charles University	1990
France		University of Paris 7	1979
France	■	Union of University of Luis Pasteur, University of Marc Bloch and University of Robert Schuman	1996
France		Union of Universite Joseph Fourier (Grenoble I), Universite Pierre Mendes France (Grenoble II),	2000

		Universite Stendhal (Grnoble III) and Institut National Polytechnique de Grenoble	
Germany	■	Free University of Berlin	1984
Germany	■	Ludwig-Maximilians-University of Munich	1989
Germany	■	Rhenish Friedrich-Willhelm Uiniversity of Bonn	1990
Germany	■	Rupert Charles University of Heidelberg	1990
Germany	■	Humboldt University Berlin	1998
Israel		Tel Aviv University	1999
Italy		University of Siena	1989
Italy		University of Bologna	1995
Italy		University of Pisa	2001
Korea, R.	■	Kyungpook National University(国立慶北大学)	1984
Korea, R.	■	Seoul National University(ソウル大学)	1991
Korea, R.	■	Yonsei University(延世大学校)	1998
Korea, R.		Korea University(高麗大学校)	2002
Lao P.D.R.		National University of Laos	2002
Mexico		University of Guadalajara	1983
Netherlands	■	Leiden University	1997
Netherlands	■	University of Utrecht	1997
New Zealand	■	University of Auckland	1997
Russia		Moscow M. V. Lomonosov State University	1987
Singapore	■	National University of Singapore	1999
Sudan		University of Khartoum	2001
Switzerland		Swiss Federal Institute of Technology	1989
Switzerland	■	University of Lausanne	1997
Sweden	■	Stockholm University	1997
Sweden	■	Uppsala University	1997
Thailand	■	Kasetsart University	1984
U. K.		University of Sussex	1989
U. K.		University of Oxford	1991
U. K.		University of Cambridge	1997
U. K.		University of Nottingham	1999
U. S. A.		Wayne State University	1985
U. S. A.		Stanford University	1989
U. S. A.	■	University of California	1990
U. S. A.		Polytechnic University	1990
U. S. A.		Brown University	1992

U. S. A.	■	George Washington University	1998
U. S. A.		Tufts University	1998
U. S. A.		University of Illinois at Urbana-Champaign	1999
U. S. A.		University of Pennsylvania	1999
U. S. A.		University of Hawai'i	2003
U. S. A.		University of Michigan	2003

■Student Exchange Agreement

Agreement made between Departments

Countries	Universities
Australia	University of Wollongong
Austria	University of Innsbruck
Brazil	Federal University of Paraiba
Brazil	University of Brasilia
Bulgaria	Sofia University
Canada	Concordia University
Canada	McMaster University
Canada	University of Waterloo
Canada	University of Manitoba
Canada	University of Western Ontario
Czech	Technical University of Brno
China, P. R.	Beijing Polytechnic University
China, P. R.	Dalian University of Technology
China, P. R.	Harbin Archit. And Civil Eng. Institute
China, P. R.	Hohai University
China, P. R.	IWCHPR
China, P. R.	Nanjing Hydraulic Research Institute
China, P. R.	Northern Jiaotong University
China, P. R.	Peking University
China, P. R.	Shaanxi Institute of Mech. Eng.
China, P. R.	Shanghai Jiao Tong University
China, P. R.	Tongji University
China, P. R.	Tsinghua University
China, P. R.	X'ian Jiaotong University
Denmark	Technical University of Denmark
Egypt	Cairo University

Egypt	Water Research Center
Finland	Helsinki University of Technology
Germany	University of Karlsruhe
Indonesia	Bandung Institute of Technology
Iran	Iran University of Science and Technology
Kenya	Jomo Kenyatta University of Agriculture and Technology
Korea	Kunkuk Univeristy
Korea	Seoul Development Institute
Korea	Sung Kyun Kwan University
Mexico	University of Queretaro
Mongolia	Mongolian Technical University
Nepal	Tribhuvan University
Netherlands	Delft University of Technology
Peru	Pontifical Catholic University of Peru
Portugal	Technical University of Lisbon
Sweden	Joenkoeping International Business School
Sweden	Royal Institute of Technology
Thailand	Asian Institute of Technology
Thailand	Chulalongkorn University
Thailand	Kasetsart University
U. K.	Oxford Polytechnic
U. K.	University College London
U. K.	University of Reading
U. S. A.	Carnegie-Mellon University
U. S. A.	Cornell University
U. S. A.	MIT
U. S. A.	Rice University
U. S. A.	University of California, Berkeley
U. S. A.	University of Delaware
U. S. A.	University of Hawaii at Manoa
U. S. A.	University of Illinois
U. S. A.	University of Iowa
U. S. A.	University of Kentucky
U. S. A.	University of Colorado at Boulder
U. S. A.	University of Southern California
Venezuela	Laboratorio Nacional de Hidraulica

Vietnam	Institute of Meteorology and Hydrology
Vietnam	Vietnam National University of Hanoi
Yugoslavia	University of Belgrade
Yugoslavia	University of Skopje

Agreement made between Departments (from the year of 2002)

Countries	Universities	concluded
Korea	Graduate School of Civil Engineering, Konkuk University	2002
Korea	Department of Civil and Environmental Eng., Chung-Ang University	2003
Korea	Graduate School of Civil Engineering, Hanyang University	2003

Campus Map (Yoshida Campus)

1. Main Gate
2. Clock Tower
3. Central Administration
4. Student Lounge KI-ZU-NA
5. Center for Student Health
6. Student Affairs Department
7. University Library
8. Institute of Economic Research
9. Center for Archaeological Operations
10. Faculty of Education
11. Faculty of Letters Exhibition Hall
12. The Kyoto University Museum
13. Faculty of Law and Economics Main Bldg.
14. Faculty of Law and Economics North Bldg.
15. Faculty of Law and Economics Research Bldg.
16. Faculty of Letters
17. Faculty of Letters East Bldg.
18. Faculty of Engineering Bldg.No.9
19. Faculty of Engineering Bldg.No.4
20. **Faculty of Engineering Bldg.No.5**
21. Faculty of Engineering Bldg.No.7
22. **Academic Center for Computing and Media Studies**
23. Faculty of Engineering Bldg.No.3
24. Faculty of Engineering Bldg.No.10
25. Faculty of Engineering Bldg.No.8
26. **Faculty of Engineering Bldg.No.1**
27. Venture Business Laboratory (VBL)
28. Faculty of Engineering Dept.of Physics Bldg.
29. Faculty of Engineering Bldg.No.6
30. Faculty of Engineering Integrated Research Bldg.
31. Faculty of Engineering Bldg.No.2
32. Faculty of Engineering Radioisotope Research Laboratory
33. Faculty of Engineering Bldg.No.11
34. Faculty of Integrated Human Studies Bldg.No.1

Campus Map (Uji Campus)

1. Main Gate
2. **Uji Campus Main Bldg.**
   Administration Office of Uji Campus
3. Uji International House
4. Accelerator Laboratory
5. Nucleic Acid Research Bldg.
6. Bioinformatics Center
7. Biotechnology Laboratory
8. Cryogenic Laboratory
9. Electron Spectromicroscope Bldg.
10. Joint Research Laboratory
11. North No.1 Bldg.
    (Institute of Advanced Energy)
12. North No.2 Bldg.
    (Institute of Advanced Energy)
13. North No.3 Bldg.
    (Institute of Advanced Energy)
14. North No.4 Bldg.
    (Institute of Advanced Energy)
15. South No.1 Bldg.
    (Institute of Advanced Energy)
16. South No.3 Bldg.
    (Institute of Advanced Energy)
17. Wood Composite Hall
    (Wood Research Institute)
18. Termite Laboratory
19. Xylarium (Wood Research Institute)
20. Research Center for Disaster Reduction Systems
21. Research Center for Earthquake Prediction
22. Boundary Layer Wind Tunnel Laboratory
23. Earthquake Response Simulation Laboratory
24. Solar Power Station Laboratory
25. Microwave Energy Transmission Laboratory
26. Electromagnetic Wave Laboratory
27. Wind Tunnel Laboratory
28. Super Air Gasdynamics Laboratory
29. Radiation Laboratory
    Quantum Science and Engineering Center
30. Pilot Plant Factory of New Materials for Food Processing
31. Experimental Station for Plants and Animals
32. South No.2 Bldg.
33. Graduate School of informatics