

Chair Environmental Development Engineering

2.5.8 Laboratory : Agricultural Facilities Engineering

| | | |
|----------|---------------------|----------------------------------|
| Member : | Professor | Murakami Akira, Dr. Agric. Sci. |
| | Associate Professor | Kobayashi Akira, Dr. Eng. |
| | Assistant Professor | Kiyama Shouichi, Dr. Agric. Sci. |
| | Doctor's program | 1 |
| | Master's Program | 5 |
| | Undergraduate | 7 |
| | Other | 0 |

A. Research Activities (2010.4-2011.3)

A-1. Main Subjects

a) Simulation of behavior of facilities and foundation

To examine the mechanical and environmental safety of agricultural facilities and those foundations, the simulation methods were developed. DEM was used to understand the macroscopic failure of soil composed of the small particles. The new inverse analysis method was tried to identify the mechanical parameters of foundation. Moreover, the estimation method of heterogeneous distribution of hydraulic parameters was developed to simulate the groundwater behavior in subsurface dam.

b) Non-destructive method for long used hydraulic facilities for irrigation

To make the strategy for the maintenance of long used hydraulic facilities for irrigation activity, non-destructive methods such as impact acoustic method, electrical resistivity survey and electro-magnetic method to investigate the state of the structure or subsoil has been developed. The developed method was applied to the actual irrigation tanks, and the inner situation of tanks having the leakage was examined.

c) Research on dynamic behaviour of irrigation tank

The irrigation tank does not have enough seismic capacity for a large earthquake because the level of the standard is low. Therefore, many irrigation tanks have failed by the earthquakes and the secondary disaster has occurred. However, the seismic behaviour of irrigation tank has not been observed so well. This is because the instruments for measurement of seismic behaviour have not been installed in the dam body. To observe and investigate the seismic behaviour of the irrigation tank, the small shaking experiment was carried out.

d) Sustainable regional development in the context of local environmental policy

Address Japanese multiple social issues closely relevant to rural sustainability with the approach of environmental economics and policy making to find a cooperative management system solving relevant problems. Developing multi-regional dynamic computable general equilibrium model with life cycle assessment methodology, the feasibility of sustainable regional development in the watershed water environmental policy was investigated.

A-2.Publications and presentations

a) Publications

Original Papers(including book-reviews)

- Murakami, A., Wakai, A. and K. Fujisawa: Numerical methods, Soils and Foundations, Vol.50, No.6, pp.877-892, 2010.

- Nishimura, S., Murakami, A. and K. Matsuura: Reliability-based design of earth-fill dams based on the spatial distribution of strength parameters , Georisk, Vol.4, No.3, pp.140-147, 2010.

- Fujisawa, K., Murakami, A. and S. Nishimura: Numerical analysis of the erosion and the transport of fine particles within soils leading to the piping phenomenon, Soils and Foundations, Vol.50, No.4, pp.471-482, 2010.

- Fujisawa, K., Murakami, A. and S. Nishimura: Simultaneous modeling of internal erosion and deformation of soil structures , Geoenvironmental Engineering and Geotechnics: Progress in Modeling and Applications (GSP204), ASCE, pp.71-78, 2010.

- Fujisawa, K., Nishimura, S. and A. Murakami: Numerical analysis of dynamic behavior of seepage flow with finite volume method, Journal of Applied Mechanics, Vol.13, pp.195-202, 2010 (in Japanese).

- Shuku, T., Murakami, A., Nishimura, S., Fujisawa, K. and K. Nakamura: Data assimilation of the settlement behavior of Kobe Airport constructed on reclaimed land using the particle filter, Journal of Applied Mechanics, Vol.13, pp.67-77, 2010 (in Japanese)

- A.K.M. Adham and Kobayashi A.: Effect of global warming on the dissolution of limestone, Journal of Rainwater Catchment Systems Vol. 15, No.2, pp.1-9,2010

- Inoue K., Uffink G.J.M., Kobayashi A., Matsunaga N. and Tanaka T. : Disparity of macrodispersivity estimated from temporal and spatial moments using random walk particle tracking in heterogeneous porous formations, Journal of Rainwater Catchment Systems, Vol. 15, No.2,pp.21-31, 2010

- A.K.M. Adham, Kobayashi A. and Teranishi S. : Dissolution of limestone and sustainable groundwater development from underground dam area, Journal of Rainwater Catchment Systems s, Vol.16, No1, pp.1-9, 2010

- Kobayashi A., Hayashi T., Yamamoto K. and Kiyama S. : Mechanism of failure and damage probability of irrigation tank at Mid Niigata prefecture earthquake, Transactions of the Japanese Society of Irrigation, Drainage and Rural Engineering, No.266, pp.11-18, 2010

- Tanaka S. and Kobayashi A.: Studies of analysis about sand specimen by Acoustic Emission, EIT-JSCE Symposium on Engineering for Geo-Hazards: Earthquakes and Landslides – for Surface and Subsurface Structures, CD-ROM, 2010

- Okada K. and Kobayashi A.: New inference method of inner situation of irrigation tank by elastic wave exploration, EIT-JSCE Symposium on Engineering for Geo-Hazards: Earthquakes and Landslides – for Surface and Subsurface Structures, CD-ROM, 2010

- Teranishi S. and Kobayashi A. : Groundwater analysis at the subsurface dam and optimum distribution of intake wells, EIT-JSCE Symposium on Engineering for Geo-Hazards: Earthquakes and Landslides – for Surface and Subsurface Structures, CD-ROM, 2010

- Akira Kobayashi, Takuma Hayashi, Kiyohito Yamamoto and Shoichi Kiyama, Seismic risk management of irrigation system in an earthquake: based on data from the Mid Niigata prefecture earthquake, Transactions of JSIDRE, No.269, pp.13-23, 2010.

- Kiyama Shoichi, Assessment of investment system for rural resources and water quality management: multi-objective optimisation of interregional sustainable development, International Journal of Environmental Policy and Decision Making, Vol.1, No.1, pp.77-96, 2010.

- Kiyama Shoichi, Development of iterative multiplier method for information estimation depending on regional dimensions, Proceedings of The 31st IASTED International Conference on Modelling, Identification, and Control, Edited by H.M.Hamza, pp.391-398, 2011.

Reports,others

- Kiyama Shoichi: Conducive Agricultural Resources Management to Sound Water Cycle and Equitable Regional Benefit Allocation, Report of Sciences Research Grant, Basic Research (C) No. 19510047, 2010.

b) Conference and seminar papers presented

- H22 National Conference of JSIDRE: 9 papers
- 13th National Symposium of Applied Mechanics: 2 papers
- 45th Japan National Conference on Geotechnical Engineering: 4 papers
- 15th National Conference on Computational Engineering and Science: 1 paper
- 60th National Congress on Theoretical and Applied Mechanics: 1 paper
- 67th Kyoto Branch Conference of JSIDRE: 2 papers
- EIT-JSCE Joint International Symposium, Monitoring & Modelling in Geo-Engineering: 3 papers
- The 31st IASTED International Conference on Modelling, Identification, and Control: 1 paper

A-3.Off-campus activities 1

Membership in academic societies

- Murakami, A. : Japanese Geotechnical Society (Vice president, Vice-Chairman of President Special Committee, Vice-Chairman of Promotion Committee of Public Interest Corporation), Japanese Society of Irrigation, Drainage and Reclamation Eng. (Board, Editor of Trans.JSIDRE, Member of Dam Committee, Member of Sawada Awards Committee, Member of Publishment Committee), Japan Soc. Civil Eng. (Fellow, Member of Applied Mechanics Committee), Japan Rainwater Catchment Systems Association (Board Member), Japan Society for Computational Methods in Engineering (Councilor), Research Institute of Signal Processing, Japan (Editorial Board), The Japan Federation of Engineering Societies (Board Member)

- Kobayashi, A. : Japanese Society of Irrigation, Drainage and Reclamation Eng. (member of committee of dam, Officer of Kyoto branch),, Japanese Geotechnical Society (Domestic member of ATC8), Japan Soc. Civil Eng.(Member), Japanese Association of Groundwater Hydrology (Member),, J. Soc. Computational Eng. (Member), Int. Soc. of Rock Mechanics (Member), Japan Rainwater Catchments System Association (councilor).

- Kiyama, S. : Japanese Society of Irrigation, Drainage and Reclamation Eng. (Member), Japanese Geotechnical Society (Councilor of Kasai branch), Japan Soc. of Civil Eng. (Member),, Society for Environmental Economics and Policy Studies (Member)

A-3.Off-campus activities 2

Research grants

1. Grants-in-aid for Scientific Research(KAKENHI)

- Basic research (B) : Murakami A. : Functional diagnostic system by data assimilation and unified measurement for stock management of soil structure
- Basic research (B) : Kobayashi A. : Asset management method of irrigation hydraulic structures for risk of disaster of earthquake and downpour
- Basic research (C) : Kiyama S. : Adaptation and mitigation strategies of agricultural technology to climate change in the context of sustainable rural development

A-4.International cooperation and overseas activities 1

Membership in academic societies

- Murakami, A.: International Society of Soils Mechanics and Geotechnical Engineering (Technical Committee 34, Secretary), International Association for Computer Methods & Advances in Geomechanics (Board Member), Multidisciplinary International Society on Inverse Problems in Science and Engineering (Member)
- Kobayashi A.: Korean Nuclear Society, Referee of International Journal

B.Educational Activities(2010.4-2011.3)

B-1.On-campus teaching

a) Courses given

- Undergraduate level: Seminar in Rural Facility Engineering (Kobayashi and Kiyama), Applied Mechanics (Kobayashi share), Soil Mechanics and Concrete Engineering (Kobayashi), Laboratory Course in Soil Mechanics, Concrete Engineering and Environmental Geotechnique (Kobayashi and Kiyama), Exercise in Information Processing, Basics (Kiyama, share), Seminar in Agricultural and Environmental Engineering (Murakami share), Design of facilities for agricultural engineering (Murakami)
- Graduate level: Planning and Design of Rural Facilities (Murakami), Numerical Science of Structural Design (Kobayashi), Laboratory Course in Agricultural Facilities Engineering (Kobayashi), Advanced Course of Data Processing for Design I (Kobayashi), Advanced Course of Data Processing for Design II (Murakami)

B-2.Off-campus teaching etc.

Part-time lecturer

- Murakami, A.: Okayama Univ., (Structural Mechanics I & II, Management of Environmental Structures, Management of Environmental Facilities)

- Kobayashi A.: Tokyo Institute of Technology (Underground environment)

B-3.Overseas teaching 1

International students

- International students : Doctral 1 (Bangladesh)

C.Other Remarks

- Murakami, A. : Member of council for engineering problems in design and construction of dams for irrigation use in Kyusyu and Chu-Shikoku area (JIID), Member of the committee of performance design of irrigation structures, JIID, Chair of the subcommittee of foundation and soil structure in the committee of performance design of irrigation structures, JIID, Member of technical subcommittee for council of food, agriculture and rural area policies, MAFF

- Kobayashi, A. : Member of council for huge earthquake countermeasure (Tokai agricultural administration office), , Chair of committee for asset management of irrigation facilities (Shiga prefecture), , Chair of committee of new technology introduction (Kinki agricultural administration office), , Member of council for performance of seismic countermeasure, Member of technical committee for Iwate-Miyagi earthquake, , Member of council for engineering problems in design and construction of dams for irrigation use, , Member of the committee for seismic technology of irrigation structures, Member of the committee of performance design of irrigation structures, JIID.,, Member of committee of dams for irrigation use, Member of committee on long use of dams for irrigation use, JSIDRE, , Member of the committee on the research activity of geological disposal, Member of the committee on the advanced development of chemical effect on disposal system, Japan Nuclear Cycle Development Institute, Councilor of JIID

- Kiyama, S. : Committee member of lake planning of HIYOSHI dam water resource region, Ministry of land, infrastructure and transport, Committee member of environmental planning of HIYOSHI dam water resource region, Deputy director of community school and committee member of “Edu-tope Project” of Kyoto city Shirakawa high school of total support