Hydraulic and Ecohydraulic Studies in River Basins

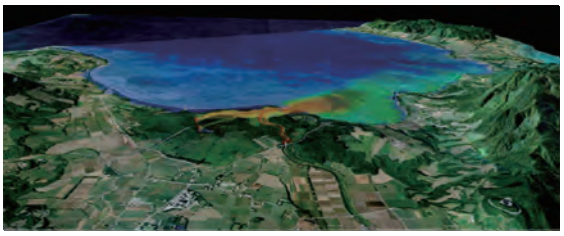
My research areas are river engineering, ecohydraulics and environmental hydraulics. My recent research topics of interest and brief explanations of each are given below.

(1) Water flow and material cycle models river basins

We are working to develop water flow and material cycle models for river basin that can reproduce the dynamic behavior of water and materials across land, river and coastal areas. These models will enable us to evaluate the impact on various social system changes involving water and material cycles within a basin area and propose appropriate management methods. We will also study the impact of the changes in water and material cycles on the ecosystem **from the viewpoints of ecology and geochemistry**.

(2) Basin environmental management

Today, the regeneration of natural environments and harmonious coexistence between man and nature are essential for successful national land formation plans in Japan. It is therefore necessary for us to propose and demonstrate a management system with the three main pillars of the natural environment, water cycle systems, and the social environment. This involves a focus on basin areas and catchment basins, which are the basic units of the water cycle. Consequently, we plan to establish a **management cycle** consisting of the following: the creation and analysis of the GIS database on natural and social environments in the basin; problem finding and presentations of issues through workshops; a study of evaluation methods for achieving sustainability in basins; scenario setting; a trial in the area; and evaluation and policy proposals for pioneering basin environmental management.



Suspended sediment dynamics in the Nagura River Basin, Okinawa, Japan

About Researcher

AKAMATSU Yoshihisa, Ph.D.

Ph.D., 2003, Tokyo Institute of Technology

Prevention from Flood Disaster

My research areas are computational hydraulics, disaster prevention hydraulics, and environmental hydraulics. Recent research topics of interest to me and brief explanations thereof are given below.

(1) Numerical simulation for open channel flows with large eddy simulation (LES)

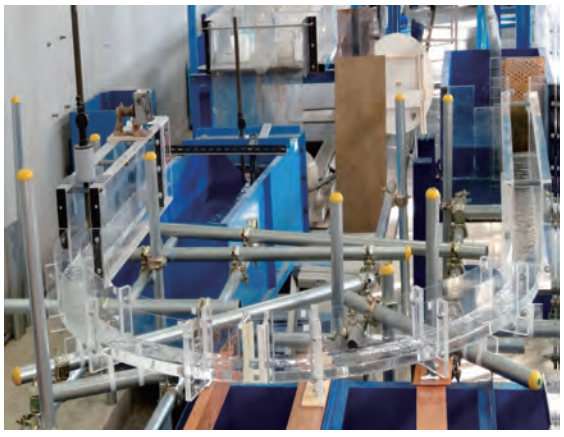
I have conducted **numerical simulations with LES** for hydraulic problems such as back step flows, local scour around river structures, and the secondary flow of meandering rivers.

(2) Lateral overflow from curved channels

River banks can break where rivers curve. However, existing formulations of lateral overflow have been developed for straight channels. In this study I have developed **lateral overflow discharge formulations for curved channels**. The photo shows the experimental setup for this study.

(3) Study on the use of light emitting diodes (LEDs) to purify lake water

It is very important to improve the Dissolved Oxygen (DO) concentration or low DO concentration of water columns in the lower layers of lakes. My laboratory has been developing **a DO improvement technology that utilizes LEDs**.



Experimental setup for study on lateral overflow in curved open channels

About Researcher

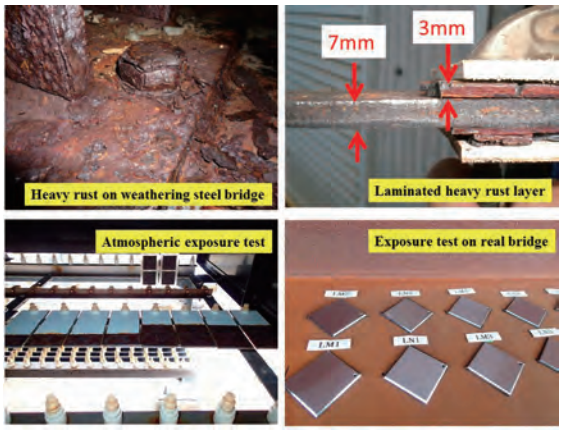
ASAI Koji, Dr.Eng.

Dr.Eng., 1995, Kyushu University

WEB ≫ http://www.suiri.civil.yamaguchi-u.ac.jp/index2.php?

Corrosion and Maintenance of Weathering Steel Bridges

Bridges are generally categorized into Two types: concrete and steel. For steel bridges, preventing corrosion is very important. We have studied the corrosion of and maintenance techniques used with steel bridges. In particular, for weathering steel, which has recently been widely used, we are conducting research by experiment and analysis. **Weathering steel** can provide corrosion protection without a paint layer. This makes the life cycle cost of bridges built with weathering steel lower than those with painted steel bridges. This advantage has led to an increased use of weathering steel in the structural components of steel bridges in Japan. In some cases, however, very severe surface corrosion damage has been observed. Our main objectives are 1) to clarify the **corrosive environment** under which weathering steel exhibits this phenomenon, 2) to clarify the expression mechanism of dense protective rust. These studies have been carried out by exposure tests in the field, element tests in the laboratory, and through numerical analysis. **Inspection guidance and repair techniques** for weathering steel bridges severely damaged by corrosion has also been studied in collaboration among industry, government, and academia.



Weathering steel rust and exposure tests

About Researcher

ASO Toshihiko, Dr.Eng.

Dr.Eng., 1992, Kyushu University

WEB ≫ http://www.bridge.civil.yamaguchi-u.ac.jp/index-jp.html

Long Term Durability of Cement and Lime-Stabilized Soil

Deterioration of cement and lime-stabilized soil under some natural environments has become an important issue for the **long-term durability** of improved soft ground. One study confirmed the deterioration of stabilized soil being used at the foundation of a dike constructed several decades ago and located along a **tidal river** in Japan. However, due to its short history, the long-term durability of soil stabilization by chemical methods has not been discussed. We have been carrying out the following research to help solve the problem of chemically-stabilized soil deterioration.

1) Elucidation of deterioration phenomenon with regard to stabilized soil, including the leaching mechanism of solidification components, speed of deterioration progression, and changes in strength and deformation properties. 2) Development of a method to evaluate the long-term durability of stabilized soil in marine environments. 3) Development of **new solidification materials** for ground improvement that have high durability in marine environments.


Deteriorated lime-treated clay in a marine environment

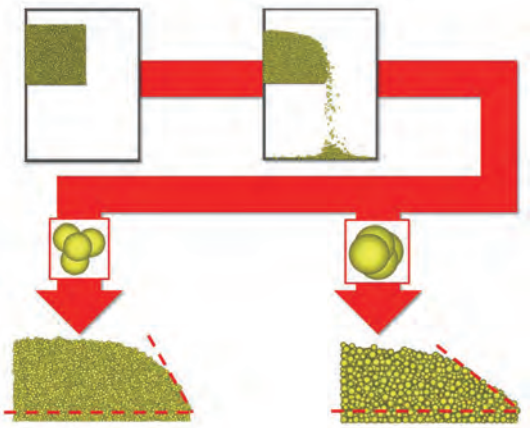
About Researcher

HARA Hiroyuki, Dr.Eng.

Dr.Eng., 2010, Saga University

Strength and deformation characteristics of the ground, from micro to macro

If you pick up some soil, you can see that it is an aggregation of small particles. The ground is stable and maintains a stationary state when these particles are in contact and interact with each other through the action of deposition due to flowing water, forces of construction and so on.
The ground loses its stability when the externally applied forces exceed the strength resistance of particle groups, and this gives rise to landslides and ground subsidence.
Consequently, **the behavior of small particles** is **important** to understanding **the response of the ground as a whole**.
Therefore, this study focuses on the influence of the behavior of small particles based on analysis of characteristics that derive from differences in the strength and shape of the soil. In addition, it aims to propose a method capable of representing actual soil based on particle characteristics and the influence of water present among the particles, and make the relevant analysis **easier and faster**.



Changes in slope inclination due to particle shape differences

About Researcher

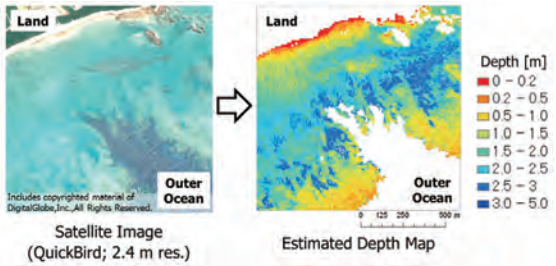
KAJIYAMA Shintaro, Dr.Eng.

Dr.Eng., 2017, Yamaguchi University

WEB ≫ http://geotech.civil.yamaguchi-u.ac.jp/

Development of Remote Sensing and Data Analysis Methods

With an interest in remote sensing, statistics, and meteorology, I have been developing **remote sensing algorithms** for such applications as mapping surface solar radiation and the water depth of coral reefs. I have also developed a method for analyzing secular trends in surface solar radiation, as well as a short-term prediction system for PM2.5 concentrations.
The targets of my methods are diverse, but the underlying principle is the same: the combination of **physical and statistical theories**. My best achievement may be the statistical combination of optical remote sensing and spatial interpolation for shallow water bathymetry, which is proposed in my first international journal paper published in 2011.
As I belong to the engineering department, writing journal papers is not my goal. Most of the remote sensing algorithms proposed in international journals, including mine, are not used by others. I aim to put at least one of my methods used into practice, hopefully on a large scale. For **nationwide applications** of my remote sensing methods, I am looking for collaborations with local/central governments.



High resolution reef bathymetry obtained by my algorithm

About Researcher

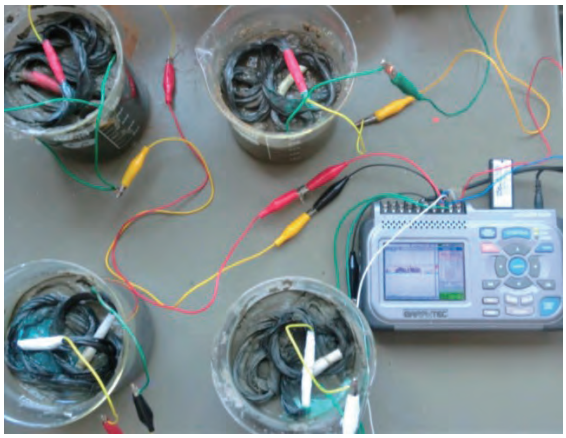
KANNO Ariyo, Ph.D.

Ph.D., 2010, The University of Tokyo

WEB ≫ http://web.cc.yamaguchi-u.ac.jp/~kanno/

Geo-Environmental Condition Improvement and Green Energy by Using Microbial Fuel Cells

Microbial fuel cell (MFC) is a bio-electrochemical device in which green energy can be generated as bio-electricity by the metabolic action of bacteria. Organic matters are used by the bacteria to sustain life and conduct activities. As organic matter is broken down, electrons are released. Our aim is to design a MFC system to harvest these electrons and acquire the bioelectricity as green energy. By using living plants, bioelectricity can also be generated in Plant Microbial Fuel Cells (PMFCs). In this method, plants act as ecological solar cells, getting sunlight and producing food through their green leaves. Excess food comes to the root zone and is used by the bacteria, allowing bioelectricity to be generated again. We are also working on a technique in bio-geotechnical engineering which involves improving the **geo-environmental condition** of contaminated tidal flat areas and using microbial fuel cell technology to generate green energy while remediating contaminated areas. The **bio-cementation** of sandy soil and **bioremediation** of saline soil are other areas of my research interest.



Experimental setup of microbial fuel cell to improve the geo-environmental condition of contaminated soil

About Researcher

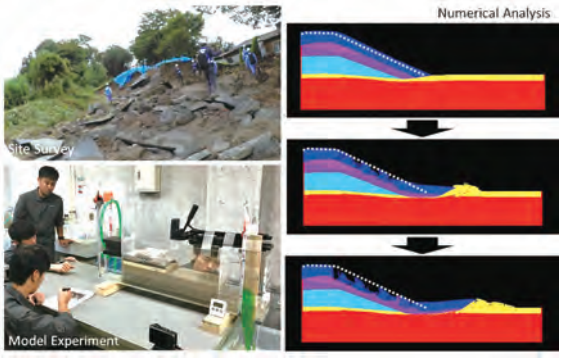
MOQSUD Azizul MD, Ph.D.

Ph.D., 2007, Saga University, Japan

WEB ≫ https://drazizul.wordpress.com/about/

How does a river levee breach? - A study on the processes of failure -

One of our research focuses is to better understand the mechanisms involved in river levee failures. A **river levee** is an essential piece of geo-infrastructure for protecting homes and fields from floods. However, under certain circumstances, levees can breach. For example, the catastrophic flooding along the Kinu River in 2015 is deemed to have been caused by the water level' s exceeding the crest of the levee, a process known as overtopping. Another example is the foundation failure seen along the Yabe River in 2012, where the levee breach is believed to have been caused by **piping** (or **internal erosion**) associated with seepage through a highly permeable layer in the foundation. These mechanisms are yet to be fully understood, and further complexity arises because levees are normally constructed from soils that are not well characterized. Therefore, we aim to clarify the conditions for and processes of levee failures through site investigations, model experiments and numerical analysis.



Clarifying the conditions for and processes of river levee failures through site investigations, model experiments and numerical analysis.

About Researcher

MORI Hirotoshi, Dr.Eng., MSc

Dr.Eng., 2010, The University of Tokyo

WEB ≫ http://web.cc.yamaguchi-u.ac.jp/~mori/

Permeable Pavement for Stormwater Runoff Management

Permeable pavement has been used in lightly trafficked areas since the mid-1970s to reduce stormwater runoff. Recent frequent occurrences of urban floods on a worldwide scale have prompted a broader application of the pavement to more heavily trafficked roadways. There are, however, still several problems to solve, including pavement durability, longtime performance of infiltration and storage, and the risk of geo-environmental pollution by seepage water. Our research aims to solve these problems through experiments, numerical analysis, and field measurements, and to establish design and maintenance methods for permeable pavement. Permeable pavement contributes to not only urban flood control but also groundwater recharge, improvement of urban heat problems, and fewer traffic accidents. Sophistication and diversification of road space is what we are aiming for.

Cyclic plate loading test of permeable pavement model under saturated condition

About Researcher

NAKASHIMA Shinichiro, Dr.Eng.

Dr.Eng., 2002, Kyoto University

Geomechanics from Micro to Macro and Its Application to Slope Stability

In many geotechnical engineering applications such as penetrometer testing, pile driving and end bearing resistance, and high earth or rockfill dams, soils may experience stresses high enough to break particles of even the strongest soil minerals. There are also many weak-grained **crushable soils** such as decomposed granite soil, carbonate sands, or volcanic ashes, for which particle crushing can be important even under low stress conditions. For these reasons, the effect of particle crushing on the deformation response of soils should not be neglected. This is true because a change in grain size distribution due to crushing may create a more drastic change in internal structure than can be achieved by particle rearrangement alone.

Recent years have seen the occurrence of serious **slope disasters** in the Chugoku region of western Japan. The surface geology of the areas of occurrence were covered mainly with a granite. The explication of a debris flow generating mechanism using decomposed granite soil was needed for future disaster prevention and mitigation. Simulating crushable soils using **DEM** has become a powerful tool that provides valuable insights into the micro-mechanical origins of soil plasticity and may lead to effective solutions.

Decomposed granite soil in debris disaster that occurred in Hofu city, Yamaguchi in July, 2009

About Researcher

NAKATA Yukio, Dr.Eng.

Dr.Eng., 1995, Yamaguchi University

WEB ≫ http://geotech.civil.yamaguchi-u.ac.jp/staff/nakata/index.html

Participatory Planning and Consensus Building

Participation by citizens and stakeholders in decision making processes is becoming more important in urban, regional, and environmental planning. The decision making process, where multiple individuals or organizations are involved, can be called a **participatory decision making process**. In the field of urban, regional and environmental planning, it is difficult to find alternatives that improve the conditions of the majority without making any others worse off. Consequently, a proposal for changing the status quo often causes a conflict. To govern such a conflict, individuals or organizations that have concerns about the policy need to communicate, understand each other, and find a solution. The participatory decision making process can be interpreted as a means for governing a conflict. To support a participatory decision making process, we proposed **a model that describes a policy conflic**t as the communication base, which is shared by participants involved in the participatory decision making process. We are also using **text mining methodologies** to understand participants' concerns.

Opinions aggregation in workshop discussion

About Researcher

SAKAKIBARA Hiroyuki, Ph.D.

Ph.D., 2001, Kyoto University

WEB ≫ http://www.civil.yamaguchi-u.ac.jp/?page_id=1628&lang=en

Nature Conservation and Environmental Protection through Civil Engineering Works

Our research interest is in the intersection of ecology and civil engineering. Research efforts now underway in our laboratory are focused on the following fields: 1) **Aquatic habitat evaluation** based on preferences exhibited by living organisms: we are developing a method for evaluating stone embedded fish way based on precise fish preference experiments. We are also building a robust and simple river habitat evaluation software for practical use. 2) **Toxicity assessment** from the viewpoint of protecting aquatic species: this is an attempt to explain aquatic species abundance based on water quality. We are currently developing a passive sampling technique that makes composite sampling easier. 3) **Sustainable water quality management in developing countries**: water quality problems persist in developing countries, where cutting edge technologies might not applicable. In Timor-Leste, we are working to propose a water pollution countermeasure that can be implemented by citizens based on an understanding of site-specific pollution mechanisms.

Field experiment in a stone embedded fish way to reveal the relationship between fish migration paths and their physical condition.

About Researcher

SEKINE Masahiko, Dr.Eng.

Dr.Eng., 1991, Kyoto University

WEB ≫ http://web.cc.yamaguchi-u.ac.jp/~msw/
https://www.facebook.com/masahiko.sekine

Rock Mechanics for Tunneling and Slope Stability

Rock mechanics is the theoretical and applied science of the mechanical behavior of rock and rock masses. Rock mechanics is also concerned with the application of engineering mechanics to design rock structures built in or of rock.
Our main research topics are "the development of systems for **monitoring** rock displacements", "field measurement and back analysis", "numerical **modeling**", and "underground **space design**". We have engaged in many projects involving the construction and maintenance of things such as tunnels, underground powerhouses, oil storage caverns, rock slopes, landslides, and dams.
GNSS and InSAR, which are space technologies, have been adopted in recent years to monitor ground behavior in order to identify risks at an early stage and receive early warnings of natural disasters.

Tunnels, rock slope, underground powerhouse, and dam

About Researcher

SHIMIZU Norikazu, Dr.Eng.
Dr.Eng., 1992, Kobe University

Simple Dust Monitoring Application that Runs on Mobile Phones

As a result of economic growth in East Asian countries, a variety of air pollutants are being blown into Japan. This has caused Yamaguchi Prefecture, normally a sunny place, to have more cloudy days. This means that the concentration of suspending particulate matter less than 2.5μm (PM2.5) in the air is high.
Another issue is the need to improve **working environments** at tunnel construction sites around the world to protect workers from labor induced diseases. To solve these environmental problems, I developed an innovative dust measuring and monitoring method by using the scattered light that runs on mobile phones and measures dust concentrations at tunnel construction sites. By applying this technique, I develop **mobile phone applications** to evaluate the quantity of suspended **dust concentrations** in the video image by smart phones. Once this technique is complete, it will be possible to easily ascertain current suspended dust concentrations in residential areas.

Dust monitoring using a mobile phone at a tunnel construction site

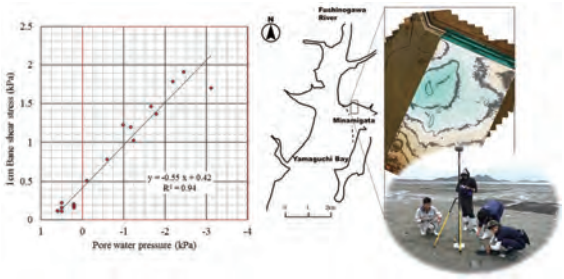
About Researcher

SHINJI Masato, Ph.D., P.E.
Ph.D., 1985, Kobe University

WEB ≫ http://tunnel.civil.yamaguchi-u.ac.jp/english.html

Morpho-dynamic Model for Sandy Tidal Flats That Considers a Groundwater Process with an Ebb and Flow Cycle

The research objective is to introduce groundwater **suction dynamics** into the morpho-dynamic model of **tidal flats**. Field experiments over several sites have revealed the important role of suction, namely, negative pore water pressure, which is present in a thin surface layer of sediment when the tidal flat is dry. The shear strength near the sediment surface increases with suction behavior. Also, morphological changes exhibit close relationships with suction dynamics due to suction-induced **void state changes** and **hardening effects**. From the above experiments, a 2DV numerical model has been proposed for the morphological prediction of a single cross-shore line.
The current theme is to develop a quasi-3D morphological prediction model for flats which can be adapted to complicated surface characteristics of flats like sandwaves, tombolos, or sand spits. In addition, we regularly conduct field observations on Minamigata tidal flat in Yamaguchi City using UAV, GNSS, etc., in order to obtain a referential datum for the numerical model and gain new insights into the links between water and sediment in coastal systems.



Linear relationship between suction and vane shear strength and an image of a periodic observation on Minamigata tidal flat

About Researcher

SHIROZU Hajime, Dr.Eng.

Dr.Eng. , 2017, Kumamoto University

Attitude and Behavior Modification to Achieve Sustainable Transportation

In modern society, motorization leads to economic growth and improves the convenience of daily life. However, excessive car use also causes various social, environmental and psychological problems. These problems are prominent issues, especially in small-mid size provincial city. For example, highly-motorized cities have a reduced need for public transport services and result in mobility gaps. With our research, it is suggested that excessive motorization causes a decline in subjective well-being and emotional place attachment toward residential place. In addition to improving infrastructure, we need to promote change concerning people's attitude and behavior in order to solve these problems and achieve **sustainable transportation**.
With these perspectives, our research explores the following: 1) How to modify people's attitude and behavior towards more sustainable behavior (**Mobility Management**), 2) How to get people more committed to engaging in public activities, 3) What is sustainable and "good" travel behavior. Regarding measures against mobility gaps in local cities, we examined the effect of car-sharing services and public transport services owned by neighborhood communities.

Effective discussion in communities is essential to achieving sustainable transport

About Researcher

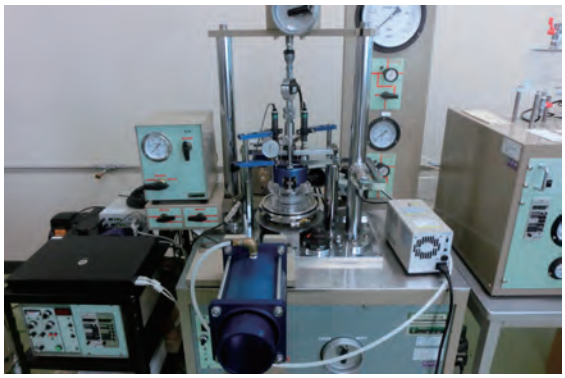
SUZUKI Haruna, Dr.Eng.

Dr.Eng., 2009, Tokyo Institute of Technology

WEB ≫ http://www.plan.civil.yamaguchi-u.ac.jp/suzukieng.html

Static and Dynamic Mechanical Properties of Naturally Cemented Soil and Risk Assessment of Earthquake-Induced Landslides

Mitigation of natural disasters is becoming an increasingly important and urgent matter in today's world. Landslides that occur during a torrential rain or earthquake are a particularly serious problem in hilly and mountainous regions like Japan. It is therefore necessary to predict and control the behavior of landslides to prevent the loss of human lives and property. We are also engaged in the following research projects through experimental and numerical approaches. According to the case histories of previous earthquakes, innumerable landslides have occurred along discontinuous planes in natural slopes composed of mudstone, sandstone, and other such rock. It is therefore very important to evaluate seismic slope stability using the shear strength of soils subjected to substantial accumulated deformation as a result of cyclic shearing. The static and dynamic mechanical properties of the soils, however, have not yet been investigated. Accordingly, cyclic ring shear tests we developed are being carried out by setting different conditions using weakly cemented sands. The current research focuses on clarifying the effects of loading conditions on the mechanical behavior of non-cemented sand, cemented sands, and the boundary surfaces between non-cemented and cemented sands. Further, the numerical solution for estimating residual deformation caused by an earthquake is tentatively being developed by application of Newmark's method as modified by us. The outcome of the research will prove useful for proposing a reasonable anti-earthquake design method.



The "Cyclic ring shear test apparatus" we developed. It is the world's smallest such apparatus (inner dia. 42mm, outer dia. 70mm, height 20mm). Shear and normal stresses, skin frictional load, shear and normal displacements, pore water pressure are severally monitored. Has a macro zoom capture system for observation of soil particles around slip surfaces.

About Researcher

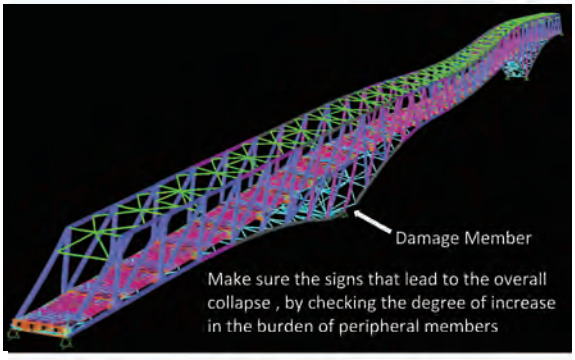
SUZUKI Motoyuki, Dr.Eng.

Dr.Eng., 1998, Shinshu University

WEB ≫ http://taishin.civil.yamaguchi-u.ac.jp/index.html

Evaluation of Bridge Redundancy

Imagine that a bridge you are using suddenly collapses. This would be a very frightening incident. In August 2007, a truss bridge in Minnesota in the United States suddenly collapsed. More than 50 vehicles fell into the Mississippi River. It is said that a damaged gusset, which is a part of the structure, might have triggered the collapse. In Japan, many bridges that were constructed during high-growth periods are now growing old. Consequently, inspections every ve years have been mandated as a national policy. However, because there are more than 700,000 bridges in Japan, it is difficult to completely eliminate the risk of deterioration and unexpected damage. Evaluations of bridge redundancy are studies that focus on the fact that a certain damaged component leads to a bridge collapse. We can prevent the worst accidents by analysing the characteristics of bridges that don t have redundancy. The construction of a safe society is my research goal.



Analysis that evaluates the redundancy of a long-span truss bridge.

About Researcher

TAJIMA Keiji, B.Eng.

B.Eng.,1996,Tokyo Institute of Technology

Inspection and Strengthening of Existing Concrete Structures

Our research field involves topics ranging from the development of **construction materials** to the **maintenance** of existing deteriorated concrete structures. We are presently focused on two main subjects: One is a research method for inspecting existing concrete members by **nondestructive methods**, including impact echoes and hammering tests. The other is evaluating the degree to which deteriorated slab was strengthened using a **running wheel loading machine**.

1) The research method for inspecting existing concrete members:
Concrete members have initial inner voids and cracks which grow into fatal defects of the member. These defects are not visible. We therefore use a nondestructive method to investigate and analyze—using sound software—these defects.

2) Evaluating the degree to which deteriorated slab was strengthened using a running wheel loading machine;
Concrete bridge slabs deteriorate through long-term use and excessive vehicle loads. Several kinds of strengthening methods are used for such slabs. The aforementioned machine evaluates the effect of the strengthening by reproducing actual damage to concrete slabs.

Running wheel loading machine and deteriorated concrete slab

About Researcher

TAKAMI Katsuhiko, Ph.D.

Ph.D., 1986, Kyushu University

Development and Renovation of Resilient Bridge Structures for a Safer City

Infrastructure such as bridges is a fundamental and essential component in supporting not only economic activity but also human society. Because degraded performance of structures in use may cause fatal accidents that injure or kill people, we must carefully inspect, evaluate and improve the performance of this infrastructure. To support the **maintenance** of bridge structures, our research will be conducted through field surveys and laboratory tests.

Our research interests are focused on the **development** and **renovation** of resilient bridge structures, and covers a wide range of target problems that runs from design and construction to demolition:

1) Development of seismic design methodology for bridge structures
2) Application of rehabilitation and retrofitting methods for bridge piers and columns in order to renovate bridge structures using functional materials
3) Evaluation of the external force on the bridge structures induced by natural disasters (earthquakes, floods, and fire)
4) Measuring structural oscillation, and monitoring and inspecting the structural performance of bridges using high-performance sensors

Our research interests concern the development and renovation of resilient bridges structures for a safer city

About Researcher

WATANABE Gakuho, Dr.Eng.

Dr.Eng., 2005, Tokyo Institute of Technology

WEB ≫ http://www.bridge.civil.yamaguchi-u.ac.jp/watanabe_lab/index.html

Coastal Erosion Caused by Massive Peat Failure and Formation of New Peat in Tidal Flat Ecosystems

Massive **coastal erosion** is occurring on Bengkalis Island in the the Strait of Malacca in **Sumatra**, Indonesia. Before the 1950s, mangrove forests grew in the coastal areas. These forests have gradually disappeared since the 1960s, and inland **peat** swamp forests have begun to erode. From 1988 to 2013, 741 hectares of peatland on the island was lost. The erosion rate on the coast has almost doubled in the last 5 years. An annual total of 2.6 Mm^3 of peat and 1.2 Mm^3 of clay has eroded into the ocean. Annual particulate organic carbon loss from the Bengkalis Island is at a peak 0.13 Tg. On the other hand, new peat is being formed in tidal flats on the other side of the island, which presents the possibility of establishing new ecosystems. Yamaguchi University is collaborating with Politeknik Bengkalis, Riau University to clarify the mechanisms of the peat failure and estimate the amount of carbon loss to the ocean.

Inland peat swamp forests are now exposed to the sea and are in danger of being eroded (Bengkalis Island, Indonesia, 2014)

About Researcher

YAMAMOTO Koichi, Ph.D.

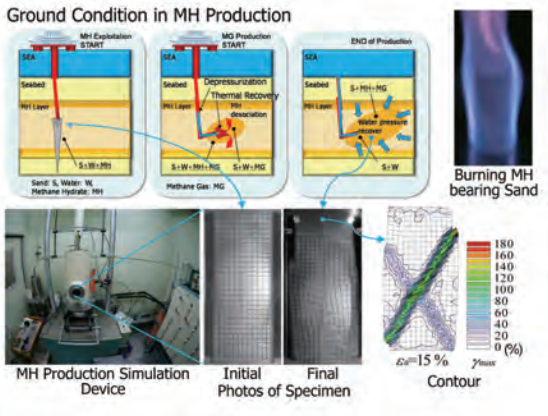
Ph.D., 2002, Hokkaido University

WEB ≫ https://www.facebook.com/yamolabo

Exploitation of Deep Seabed Resources and Geotechnical Engineering

In the deep seabed, **methane hydrate** is stable under conditions of high pressure and low temperature. It exists in a cemented state between sand particles of sandy sediments beneath the deep ocean floor. Several production methods have been proposed for extraction of the gas from hydrates, namely heating, depressurization, and inhibitor injection methods. However, there are still many uncertainties regarding the production process, especially with respect to subsurface deformation caused by dissociation. In order to solve many of these uncertain problems, our research group has performed a number of experimental and analytical studies. We have developed **special experimental devices** for methane hydrate testing, as well as a **constitutive model** and a **simulation method based on a chemo-thermo-mechanically coupled analysis** to predict ground deformation due to dissociation.

Representative articles: 1) Hyodo, M., Yoneda, J., Yoshimoto, N., and Nakata, Y.: Mechanical and Dissociation Properties of Methane Hydrate-Bearing Sand in Deep Seabed, Soils and Foundations, Vol.53, No.2, pp.299-314, 2013. 2) Yoneda, J., Hyodo, M., Yoshimoto, N., Nakata, Y., and Kato, A.: Development of High-pressure Low-temperature Plane Strain Testing Apparatus for Methane Hydrate-bearing Sand, Soils and Foundations, Vol.53, No.5, pp.774-783, 2013.



Ground condition in MH production, burning MH bearing sand, MH production simulation device, photos of specimen, contour

About Researcher

YOSHIMOTO Norimasa, Ph.D.

Ph.D., 2007, Yamaguchi University

WEB ≫ http://geotech.civil.yamaguchi-u.ac.jp/

Recyclable High Volume Fly Ash (HVFA) Concrete

My research interests include a recyclable high volume fly ash (HVFA) concrete, a steel-concrete composite slab system using a cementitious adhesive, and strengthening of steel/concrete members using fiber reinforced polymer (FRP). My current research focuses particularly on HVFA concrete made with very low cement to mitigate environmental impact such as CO_2 emission. Fly ash is the most common byproduct in coal-burning power plants, produced on a daily basis and stockpiled in large quantities. Reusing this byproduct is key to achieving a sustainable society. Concrete incorporating fly ash has superior properties such as excellent durability and low heat of hydration. The unfavorable property of HVFA concrete is the gradual but slow development of strength at early age. The early strength of HVFA concrete is improved by mixing in limestone powder. HVFA concrete is also made with limestone sand and crushed limestone aggregates so as to ensure its recyclability for future cement production. The focuses of this research project are to confirm HVFA concrete recyclability and to develop a recyclable HVFA concrete for various structural applications.

Overview of recyclable high volume fly ash (HVFA) concrete

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