Division of Environmental Studies

Department of Ocean Technology, Policy and Environment

| Laboratory | Faculty | Introduction of research activities and laboratory | Key words | Projects or activities summer program students can participate |
|----------------------|-----------------------|-------------------------------------------------------------------------------|------------------------|-------------------------------------------------------------------|
| Ozaki Laboratory | Prof. Masahiko OZAKI, | Carbon capture and storage (CCS) is a critical component to meet the | Carbon capture and | As the concept of offshore CCS is still at its development phase, |
| | Asst. Prof. Ryota | ambition of the Paris agreement. To overcome Japan's geological | storage | we foresee many other innovative concepts that are worth further |
| | WADA | constraints, we proposed the concept of offshore CCS system using sub- | Offshore; Systems | investigation. The role of summer program student is to explore |
| | | seabed geological formation and shuttle ship transfer. The project, | engineering; | the broad solution space of CCS concepts. Some ideas of the |
| | | supported by the Ministry of Environment, is expected to start | Feasibility study; | concept are utilization of carbon dioxide (known as CCUS, |
| | | demonstration project soon. Our research area covers architectural design | Ocean engineering | Carbon capture utilization and storage), or combining CCS with |
| | | | Ocean engineering | |
| | | of the concept, feasibility study, design of critical offshore structures, | | other offshore technologies (e.g. offshore wind, methane |
| | | optimization of logistics system and so on. The expertise of our laboratory | | hydrate). The student is free to choose from his own interest. |
| | | is design of offshore systems with emphasis on implementation to the real | | The research will be conducted with the frame work of System |
| | | world. Our research fields are ocean engineering and data-driven | | Engineering. Domain specific knowledge will be provided by the |
| | | approach. The concept provides flexibility and scalability to CCS systems | | lab members, although we encourage the student to study the |
| | | and will accelerate the introduction of CCS over the globe for a sustainable | | fundamentals of CCS. If the student has some specific interest |
| | | future. | | based on his/her background, we are happy to link that with CCS |
| | | | | to come up with a new research project. |
| Ocean Environment | Prof. Toru SATO | Our researches are aimed to form concepts of environmentally harmonizing | Gas hydrate formation; | Methane hydrate is considered as a promising energy resource |
| Modelling Laboratory | | systems, which coexist with natural environments for the global | Phase-field model; Gas | for the near future. To predict the gas productivity from the |
| | | sustainability. For this purpose, we are developing computational models of | hydrate distribution; | methane hydrate in the subsea sand-sediment, it is important to |
| | | environments using physics, chemistry, and biology, etc. Then these | Sand sediment | know absolute permeability accurately of the sediment bearing |
| | | models are synthesized into simulation systems in order to predict | | methane hydrate. Hence, the hydrate morphological distribution: |
| | | environmental impacts and construct public acceptance. Our research | | namely, what is the shape and morphology of hydrate, in the |
| | | interests are environmental impact assessment of CO2 storage in subsea | | sediment should be elucidated, because the permeability is |
| | | underground, biological CO2 fixation, formation and dissociation modelling | | strongly affected by the hydrate distribution. In this study, to |
| | | of methane hydrate, CO2 geological storage by hydrate, development of | | know where hydrate is formed in the pore of porous media, we |
| | | multi-scale ocean model, modelling of flashing light effect of photosynthesis | | propose a numerical model for estimating the microscopic |
| | | and the effects of CO2 on marine biota. | | distribution of methane hydrate in sand sediment, using the |

| Image: Project State P | | | | | phase-field model, which provides the mobility of the front of the |
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| Image: space space and space prof. Spinichics Developing new types of resources and energies that reduce global space mergy spinic spinichics Ocean renewable energy and ocean renewable energy and ocean renewable energy floating of them wind turbines: wather the acceptance through discussions. Ocean Resource and Energy Laboratory HIRABAYASHI Developing new types of resources and energies that reduce global sustainable society. The coean provides such opportunities. Development of coean renewable energy such as offshore wind, coean current, them of ocean space ultization. Tesearch on development of platform technologies such as riser, foating platform, station keeping and materials are investigated. Main areas of taboratory research and (5) CO2 coean space energy. 2) development of coean renewable energy. (2) development of coean space ultization or transportation, and (5) CO2 coean sequestation, (4) ocean space time taberation in the incorrect sea, i) floating research activities are on going: I) waves in the ice-covered sea, ii) float waves under stort iii) Store-imaging of ocean waves; iv) high-resolution coatal wave, current and wind modeling and observation for assisting marine sports. In the first project, we are extensively studying wave ice interaction in the Actic Coean. Wave buoys were deployed in 2018 and also in 2019. Historical and future events are studied as well. In the second project, numerical simulations of waves under typhon and analysis of the energy. Stroe photogrammetry is research the first wave courrence is high. In the third project, a field observation is conducted using stereo photogrammetry form an ocean towr to Ocean renewable energy and coean renewable eneregy and coean renewable energy. Coean sequestication, | | | | | |
| Image: space | | | | | |
| Ocean Resource and Energy Laboratory Assoc. Prof. Shinkhio. Developing new types of resources and energies that reduce global warming and negative environmental impact is a key issue to establish a sustainable society. The ocean provides such opportunities. Development of ocean renewable energy and cean natural resources. The applicant can choose what he/she wants to do after acceptance through discussions. Some examples we can offer are the design/manufacture of novel floating wind turbines, measurement and analysis of the natural resources, flow glatform, station keeping and materials are investigated. Main areas of laboratory research are (1) ocean renewable energy. (2) development of ocean natural resources, flow glatform, station for transportation, and (5) storage of resources in the ocean. Ocean waves; flow and research and wave/vortex field in the wake of a floating body. Experiments will be done in the water chamel in our laboratory. Waseda Laboratory Prof. Takuji WASEDA The following research activities are on-going; i) waves in the ice-covered sa; ii) freak waves under storm; iii) Stereo-imaging of ocean wave; iv) high-resolution coastal wave, current and wind modeling and observation tor assisting marine sports. In the first project, ware extensively studying wave-ice interaction in the Arctic Ocean. Wave buoys were deployed in 2016 and also in 2019. Historical and future events are studied as well. In the second project, numerical simulations of waves under typhoon and bomb cyclone are conducted to identify dangerous seas where the freak wave occurrence is high. In the third project, a field observation is conducted using stereo photogrammetry from an ocean towr to Ocean waves; in The student will englab. The prevent wave wave inder the wave under tow in ingeresolved nonlineer wave | | | | | |
| Energy Laboratory HIRABAYASHI warming and negative environmental impact is a key issue to establish a sustainable society. The ocean provides such apportunities. Development of ocean natural resources. The applicant can choose of ocean netwable energy such as offshore wind, ocean current, thermal, wave, and solar energies is one of the areas of our research. In addition, research on development of platform technologies such as riser, floating platform, station keeping and materials are investigated. Main areas of laboratory research are (1) ocean netwable energy. (2) development of coean natural resources, flow structure interaction in the Arctio Ocean natural resources in the ocean. energy: floating offshore wind turbines, measurement and analysis of the natural resources, flow structure interaction in the Arctio Ocean natural resources, flow structure interaction in the Arctio Ocean natural resources in the ocean. energy: floating offshore wind turbines, measurement and analysis of the analysis of the analysis of the interaction in the Arctio Ocean natural resources, flow structure interaction in the Arctio Ocean natural resources in the ocean. energy: floating offshore wind turbines, measurement of wave/vortex field in the wake of a floating body. Experiments will be done in the water channel in our laboratory. Waaeda Laboratory Prof. Takui WASEDA The following research activities are on-going: i) waves in the ice-covered sea; ii) freak waves under storm; iii) Steree-imaging of cocan waves; ivin high-resolution coastal wave, current and wind modeling and observation for assisting marine sports. In the first project, wave buoys were deployed in zostal mave, current and wind modeling and observation for assisting marine sports. In the first project, wave buoys were deployed in zostasisting wave cocurrence is high. In the third project, | Ocean Resource and | Assoc. Prof. Shinichiro | Developing new types of resources and energies that reduce global | Ocean renewable | |
| Waseda Laboratory Prof. Takuji WASEDA The following research and future events are studied as well. In the second project, numerical simulations of waves under typhon and bomb cyclone are conducted to identify dangerous seas where the freak wave occurrence is high. In the third project, a field observation is conducted using stere ophotogrammetry from an ocean tower to Ocean tower to Ocean tower to Ocean maves; fleak Waseda Laboratory research and project numerical simulations of waves under typhon and bomb cyclone are conducted to identify dangerous seas where the freak wave occurrence is high. In the third project, a field observation is conducted using stere ophotogrammetry from an ocean tower to Ocean maves; fleak in project the freak wave and project numerical simulations of waves under typhon and bomb cyclone are conducted to identify dangerous seas where the freak wave occurrence is high. In the third project, a field observation is conducted using stere ophotogrammetry from an ocean tower to Ocean maves; fleak in project wave in project wave in the following marine sports. In the first project, the field observation is conducted using stere ophotogrammetry from an ocean tower to Ocean maves; freak wave; and analysis program as well. The research model in project wave in the following research topics; developing phase resolved nonlinear wave | | | | | |
| Waseda Laboratory Prof. Takuji WASEDA The following research and wind modeling and materials are investigated. Main areas of utilization, and (5) storage of resources in the ocean. Ocean space utilization: focating wind utrbines, measurement and analysis of the natural resources; flow structure interaction Waseda Laboratory Prof. Takuji WASEDA The following research and wind modeling and observation for assisting marine sports. In the first project, we are extensively studying wave-ice interaction in the Actic Ocean. Wave buoys were deployed in 2016 and also in 2019. Historical and future events are studied as well. In the second project, numerical simulations of waves under to identify dangerous seas where the freak wave occurrence is high. In the thrid project, a field observation is conducted to identify dangerous seas where the freak wave occurrence is high. In the thrid project, a field observation is conducted using steree photogrammetry from an ocean tower to Ocean space utilization: Some examples we can offer are the design/manufacture of floating platform, development of pattorm, development of effective wave absorbing systems; ocean natural resources; flow wave absorbing systems, adsign of novel energy-sharvesting systems; and measurement of wave/vortex field in the wake of a floating body. Experiments will be done in the water channel in our laboratory. Waseda Laboratory Prof. Takuji WASEDA The following research activities are on-going: i) waves in the ice-covered for assisting marine sports. In the first project, we are extensively studying wave-ice interaction in the Actic Ocean. Wave buoys were deployed in 2016 and also in 2019. Historical and future events are studied as well. In the second project, numerical simulations of waves under typhoon and borb cyclone are conducted to ide | | | | | |
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| | | | wave occurrence is high. In the third project, a field observation is | | English. The past UTSIP students undertook the following |
| reconstruct 3D surface wave geometry. We plan to extend this method to model based on High-Order Spectral Method; Synthetic Aperture | | | conducted using stereo photogrammetry from an ocean tower to | | research topics: developing phase resolved nonlinear wave |
| | | | reconstruct 3D surface wave geometry. We plan to extend this method to | | model based on High-Order Spectral Method; Synthetic Aperture |
| be used on board the ship. In the fourth project, aiming for the 2020 Radar image analysis for ocean waves; assessment of wave | | | be used on board the ship. In the fourth project, aiming for the 2020 | | Radar image analysis for ocean waves; assessment of wave |
| Olympic game, we are constructing a data base for the sailing competition. power considering the performance of Wave Energy Converter; | | | Olympic game, we are constructing a data base for the sailing competition. | | power considering the performance of Wave Energy Converter; |
| The overall activities in our group encompasses theoretical, observational optimization of sail assisted ship navigation; freak wave | | | The overall activities in our group encompasses theoretical, observational | | optimization of sail assisted ship navigation; freak wave |
| and numerical studies of ocean waves, currents and wind. The acquired occurrence near Japan; Arctic cyclone climatology. The student | | | and numerical studies of ocean waves, currents and wind. The acquired | | |
| with prior programming knowledge with Matlab, Python, C, | | | | | |

| knowledge will be applied to the developments of the Northern Sea Route, safe navigation and operation at sea, and marine renewable energy. | Fortran 90, GrADS, etc. may have an advantage undertaking the project, but, the senior students will guide those who do not have |
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| | any experience. The research topics can be determined upon discussion with Prof. Waseda prior to the visit to Japan via e-mail exchange. We are happy to host those who are interested not |
| | only in research but also in learning about Japanese culture. |
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