Year 2012

Graduate School of Systems and Information Engineering , University of Tsukuba

Department of Engineering Mechanics and Energy

Dedicated to developing engineers with a broad, interdisciplinary viewpoint by allowing students to learn widely across a conventional framework of individual technical fields

Main features of the department

The department provides education and academic training in research on comprehensive engineering technology based on the principles of mechanics by removing the boundaries between the conventional technical fields of mechanical engineering, civil and environmental engineering, aeronautical engineering, and electrical engineering. In this approach, we aim to produce engineers with a broad viewpoint and fresh ideas that go beyond the boundary of each technical field.

Students can take courses over a wide range of fields including structural engineering, disaster mitigation and reliability engineering, solid mechanics and materials science, fluid and environmental engineering, and energy and thermal engineering. Students can take courses across the fields regardless of their areas of study. An intellectually stimulating environment is provided by a mix of professors and students with diverse interests, such as building robots, flying airplanes, exploring space, finding solutions for future energy needs, cleaning up lakes, building earthquake-resistant buildings, and developing systems for tsunami protection.

Entrance exam

TOEIC and TOEFL scores are used to assess an applicant's English ability. The selection is also based on academic records and results of oral examinations, including oral exams in mathematics and physics. The entrance exam schedule is shown in the department website.

Admissions for international applicants

International applicants usually spend a research studentship (Kenkyu-sei) period preparing for the admission examinations with the assistance of a faculty member who shares the applicant's academic interests. Alternatively, some applicants skip such period and directly take the admission examinations.

The applicant is required to obtain consent from a faculty member, pertinent to his/her academic interests, to serve as an advisor during the research studentship. Refer our web page about the faculty members and research laboratories. Once the applicant has received written consent from a faculty member, he/she may send an application to the International Student Center (http://www.intersc.tsukuba.ac.jp/). Please inquire about the visa regulations at a nearby Japanese Embassy.

Contact

Feel free to contact us if you have any questions

Graduate School of Systems and Information Engineering , University of Tsukuba
Department of Engineering Mechanics and Energy

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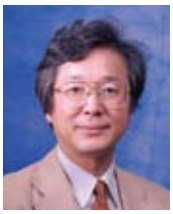
Telephone : +81-29-853-5059/5203 (Department office) **Fax :** +81-29-853-5209 **E-mail :** kouhou@kz.tsukuba.ac.jp

Message from Department Chair



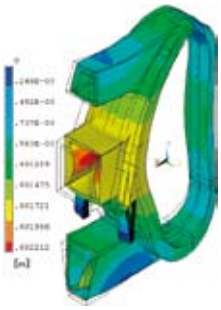
Department Chair
ABE Yutaka
E-mail:
abe@kz.tsukuba.ac.jp

In the graduate program in Engineering Mechanics and Energy, Graduate School of Systems and Information Engineering of University of Tsukuba, students study and conduct research in the fields of structural engineering, disaster mitigation engineering and reliability engineering, solid mechanics and materials science, fluid engineering, environmental engineering, and energy and thermal engineering. The graduate program in Engineering Mechanics and Energy focuses on creating new discipline to collaborate all of those individuals, societies and the environment. If you are interested in applying to our program, please contact the faculty member of your choice to discuss your research interests and studies. You can find a synopsis of the research areas of each faculty member through the department website. If you send your (tentative) research interests and appropriate research field for studies to Professor Yutaka Abe, Department Chair, you will get the information about suitable faculty members and research groups. Please do not hesitate to contact us. We recommend you to visit our campus before you make specific decisions on your research topic and living accommodations in Tsukuba. To encourage students outside our university to apply for the program, the department has adopted a selection process that makes it easy for working applicants and students from other universities to apply. Also, for working professionals who have equivalent research achievements and ability to a master's degree holder, the department offers a fast-track doctoral program ("One year doctoral program for working students"). In the program, student has a chance to complete doctoral program in as quickly as one year. Some students have already completed. On behalf of all faculty members of the graduate program in Engineering Mechanics and Energy, encourage all of you to apply to our program.

Staff and Field of Research

Solid Mechanics and Material Science

KAWAI Masamichi Modeling and experiments for deformation and strength of fiber-reinforced composite materials in aerospace structures and for inelastic and damage behavior of refractory metals in high-temperature components.
TERAMOTO Tokuo Strength evaluation and optimum material selection for structural elements such as fusion reactor first wall and superconducting magnet support.
WATANABE Osamu Study on inelastic behavior and strength for power plant or industrial plant at elevated temperature. Study on structural integrity of pressure vessel.
KAMEDA Toshihiro Computational mechanics which covers inverse analysis to obtain mechanical behavior of inelastic and / or inhomogeneous material, and FEM based on stress-strain relationship database.
MATSUDA Tetsuya Study of multi-scale simulation techniques. Property evaluation of solid materials that exhibit microscopic internal structures using homogenization theory / FEM based computational mechanics.
MATSUDA Akihiro Numerical and experimental study in polymer engineering. Life time prediction of polymer elements in electric generator. Development of new material for sports.



Structure, Disaster Mitigation and Reliability Engineering

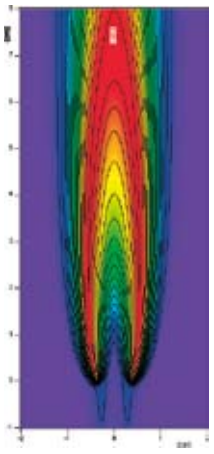
SAKAI Yuki Earthquake disaster mitigation using earthquake engineering and structural dynamics.
YAMADA Yasuo Deformation and strength characteristics of soils, Earthquake geotechnical engineering, Flow phenomenon of soils.
ISOBE Daigoro Numerical and experimental studies on impact and collapse problems of structures. Parallel control of robotic mechanisms considering dynamics and structural strength, Application of computational mechanics and structural engineering essence to robotics.
KANAKUBO Toshiyuki Studies on structural performance of seismic, isolated or controlled structures. Development of high performance structural materials and new techniques for controlling structures.
MATSUSHIMA Takashi Micro-mechanics of granular and powder materials. Mechanics of liquefaction and debris flow as a multi-phase flow phenomenon.
SHOJI Gaku Earthquake and tsunami engineering. Clarification on nonlinear dynamic response of lifeline network systems subjected to extreme ground motions and tsunami wave loads, structural reliability and risk assessment for seismic and tsunami design procedure.
YASOJIMA Akira Studies on seismic performance and disaster prevention technology of reinforced concrete structure and structural material with environmental issues, maintenance and recycle technology.

Fluid and Environment Engineering

KYOTOH Harumichi Liquid-curtain bridging to edge guides. Bubble atomization mechanism by static mixers.
SHOJI Hidenobu Unsteady fluid forces on vibrating centrifugal impeller. Theoretical study of the separated flow through a centrifugal pump in a volute casing.
TAKEWAKA Satoshi Field survey, numerical computations and remote sensing analyses on problems of coastal environments.
SAKAKIBARA Jun Experimental study on fluid mechanics and heat transfer to reveal the multi-dimensional structure of turbulence. Development of imaging diagnostics for thermal and fluid flow.
SHIRAKAWA Naoki River basin management with engineering and socio-economic approaches. Environmental flow, environmental economics, decision making process.

Energy and Thermal Engineering

ABE Yutaka Research on thermal hydraulic behavior. Development of its application for active control of energy systems.
ISHIDA Masayoshi Development of high voltage insulation technique at high temperatures and high output generation systems using fuel cells are being studied to improve efficiency on energy conversion and transmission.
ISHIKAWA Motoo Study of high efficiency direct energy conversion such as plasma MHD power generation and D-3He fusion reactors, and also ultra long HVDC.
IWASAKI Waichi Research and development toward practical use of carbon neutral energy supply system having DC network and hydrogen network.
NISHIOKA Makihito Based on reactive gasdynamics and aerothermochemistry, stabilities of fundamental laminar flames, formation mechanisms and reduction methods of pollutants such as NOx in flames are studied.
OKUNO Hikaru Research on energy conversion using magnetics, dye-sensitized solar cells, and controlling chaos of electric power system.
FUJINO Takayasu Control of hypersonic flows around reentry space vehicles by electromagnetic energy. MHD power generation with plasma flows.
KASAHARA Jiro Application of detonation phenomena to aerospace propulsion and power generation. Research and development of pulse detonation engines. Fundamental research of a steady-state detonation wave and hypersonic flow.
MONJI Hideaki Dispersed two-phase flow (bubbly flow, solid-liquid or solid-gas two-phase flows) in power and chemical plants is investigated experimentally.
KANEKO Akiko Study on fluid mechanism of multiphase flow based on the energy and environmental issue.
HANADA Nobuko Research on hydrogen energy systems and hydrogen storage materials.
TAKADA Suguru Heat transfer and fluid dynamics in Superfluid Helium, Cryogenic devices for space use.



Visiting Professors of the Cooperative Graduate School

MATSUMOTO Satoshi (Japan Aerospace Exploration Agency)
Study on thermo-fluid phenomena utilizing the International Space Station. Non-linear dynamics of levitating drop.
SUZUKI Takayuki (National Institute of Advanced Industrial Science and Technology)
Fracture mechanics for structural materials in extremely severe environments (ultra-high, cryogenic and high-magnetic environment). Non-destructive damage analysis for advanced materials by SQUID and scanning probe microscope.
TAKEMURA Fumio (National Institute of Advanced Industrial Science and Technology)
Gas-liquid two phase flow. Bubble dynamics. Research for contributions to energy saving.
YOSHIDA Hiroyuki (Japan Atomic Energy Agency)
Development of analytical methods for two-phase flow related to thermal design of next generation nuclear systems.
KATAYAMA Yasuhiro (Japan Aerospace Exploration Agency)
Research and development of computer vision system for future robotic exploration of the moon and planets.
OHASHI Hirofumi (Japan Atomic Energy Agency)
R&D on the High Temperature Gas-cooled Reactor (HTGR) and its application for the hydrogen production.
SAKAKITA Hajime (National Institute of Advanced Industrial Science and Technology)
Research using innovative plasma technologies for aerospace, medical, environmental and energy fields.
YAMAKOSHI Takao
(The Public Works Research Institute)
R&D of the prevention and mitigation technologies of the sediment-related disaster induced by debris flow, volcanic mudflow, landslide, and slope erosion.