

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

<http://www.kz.tsukuba.ac.jp/EME>

Address : 1-1-1 Tennodai Tsukuba, Ibaraki 305-8573

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
YAMADA Yasuo
E-mail:
yamada@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 and reliability engineering, solid mechanics and materials science, fluid and environmental engineering, and energy and thermal engineering with a focus on creating more harmonious relationships between the individual, society, and the environment.

If you are considering 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 on the department website. If you send Professor Yasuo Yamada, Department Chair, your (tentative) research interests and chosen field of studies, we

will refer you to suitable faculty members and research groups. Please do not hesitate to contact us. We recommend that you 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 those working professionals who have research achievements and ability considered to be equivalent to that of a master's degree holder, we offer a fast-track doctoral program ("One year doctoral program for working students") that can be completed in as quickly as one year, which some students have already completed. I encourage all of you to apply to our program.

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.

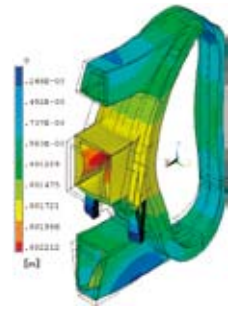
TERAMOTO Tokuo Strength evaluation and optimum material selection for structural elements such as fusion reactor first wall and superconducting magnet support.

WATANABE Osamu Power plant design and strength evaluation of materials at elevated temperature. Structural integrity of plant structure or its elements by FEM.

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.

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 Akihiko Thermodynamic coupled simulation of mechanical-thermal-chemical properties of vulcanized rubber to evaluate sealing performance and aging behavior of O-rings or rubber-seals. Large deformation analysis of laminated rubber bearings and metal dampers for seismic isolation.



Structure, Disaster Mitigation and Reliability Engineering

SUZUKI Hiroyuki Research on the ultimate strengths of steel framed structures, with emphasis on the elastic-plastic stability and the process of failure of steel structures under strong earthquake loading as well as under elevated temperatures during fire.

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.

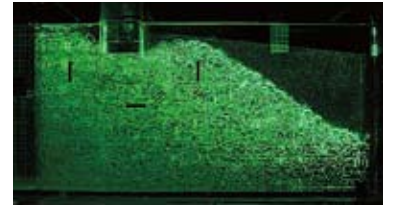
KANAKUBO Toshiyuki Studies on structural performance of seismic, isolated or controlled structures. Development of high performance structural materials and new techniques for controlling structures.

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.

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.

MATSUSHIMA Takashi Micro-mechanics of granular and powder materials. Mechanics of liquefaction and debris flow as a multi-phase flow phenomenon.

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

KAWAI Tatsuo Improvement of turbo-machinery performance by boundary layer control. Peristaltic flow through tube due to oscillating wall.

KYOTOH Harumichi Liquid-curtain bridging to edge guides. Bubble atomization mechanism by static mixers. Water-wave power generation.

SHOJI Hidenobu Unsteady fluid forces on vibrating centrifugal impeller. Theoretical study of the separated flow through a centrifugal pump in a volute casing.

MATSUUCHI Kazuo Analyses of fluid unsteadiness: sound generated aerodynamically, transition from laminar to turbulent flows, and structure of turbulence.

TAKEWAKA Satoshi Field survey, numerical computations and remote sensing analyses on problems of coastal environments.

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.

ISHIKAWA Motoo Study of high efficiency direct energy conversion such as plasma MHD power generation and D-3He fusion reactors.

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, and also ultra long HVDC.

OKUNO Hikaru Research on energy conversion using magnetics and superconductivity.

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.

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.

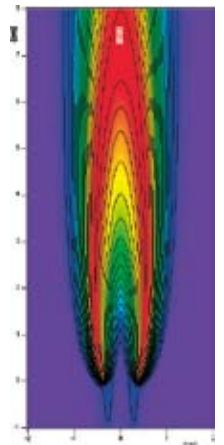
SAKAKIBARA Jun Experimental study on fluid mechanics and heat transfer to reveal the multi-dimensional structure of turbulence. Development of imaging diagnostics for thermal and fluid flow.

FUJINO Takayasu Control of hypersonic flows around reentry space vehicles by electromagnetic energy. MHD power generation with plasma flows.

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.

TAKADA Suguru Heat transfer and fluid dynamics in Superfluid Helium, Cryogenic devices for space use.



Visiting Professors of the Cooperative Graduate School

ONUKI Kaoru (Japan Atomic Energy Agency) Study on thermochemical hydrogen production cycles for hydrogen energy system.

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.

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.

YOSHIDA Hiroyuki (Japan Atomic Energy Agency) Development of analytical methods for two-phase flow related to thermal design of next generation nuclear systems.

