Advanced Core for Energetics, Hiroshima University Vol. 110

HU-ACE NEWS LETTER

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Activities of the Core

Feb. 7, 2026	Higashihiroshima Energy & Eco Seminar – 9th Session: "Zero Carbon University Challenge" (co-organized by HU-ACE)
Feb. 12, 2026	The 146th Mechanical Systems Seminar. (co-organized by HU-ACE)
Feb. 26, 2026	The 111th HU-ACE Steering Committee Meeting
Feb. 26, 2026	The 126th Hiroshima University Biomass Evening Seminar. (co-organized by HU-ACE)

"High-Yield Carbon Recovery from Palm Residues Via Hydrothermal Carbonization", proposed by Hiroshima University and Santomo Resources Corporation, was selected as an "International R&D Collaboration Project in the Field of Energy and Environment" by the New Energy and Industrial Technology Development Organization (NEDO)

This research aims at development of a new resource recycling model that contributes to the realization of a carbon-neutral society by recovering carbon with high yield by applying hydrothermal carbonization technology to palm residues, a resource that has not been fully utilized to date. Over the next three years (as currently planned), we will devote ourselves to the prevention of global warming and to the achievement of a sustainable society by moving forward with tests on the social implementation of hydrothermal carbonization of palm residue based on collaboration with the National Research and Innovation Agency (BRIN), This research combines Hiroshima University's research achievements on hydrothermal treatment of biomass with Santomo Resources Corporation's knowledge on acquisition and transportation of biomass within Indonesia. It aims to international carbon neutrality using technology originating in Japan.
Please visit the following URL for details.
https://www.nedo.go.jp/content/800047796.pdf

Related Events

Thu., Mar. 5, 13:00–16:30 Workshop: An Introduction to Biofuels *(in Japanese)* (Co-organized by HU-ACE)
Mon., Mar. 16, 16:30-18:00 The 6th Energy Storage Seminar *(in Japanese)* (Hosted by HU-ACE)
Tue., Mar. 17, 16:20–17:50 The 14th Geothermal Energy Seminar *(in Japanese)* (Hosted by HU-ACE)
Fri., Mar. 27, 16:30–18:00 The 21st Hiroshima University Biomass Premium Evening Seminar *(in Japanese)* (Co-organized by HU-ACE)
■Contact & more information: https://hu-ace.hiroshima-u.ac.jp/en/

Research consultation and joint research are welcome.

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Do You Know Energy ? No. 10

Fluid Engineering

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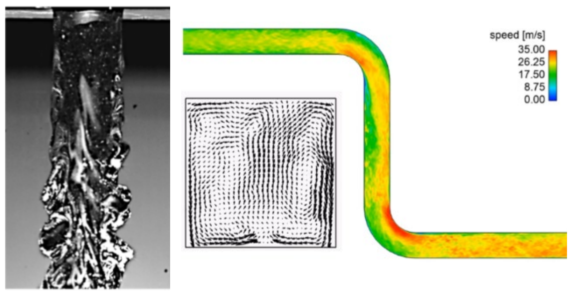
Research fields : Fluid Engineering, Mechanical Engineering
Keywords: Turbulent Flow / Two-Phase Flow / Heat Transfer / CFD

What is Fluid Engineering

Fluids include gases such as air and liquids such as water and oil. Fluid engineering is a branch of engineering that focuses on understanding properties such as viscosity, motion, and energy transfer of fluids, and applying this knowledge to the design and high efficiency of machines, devices, and structures.

How Is Research in Fluid Engineering Conducted?

Research in fluid engineering combines theoretical analysis, experiments, and numerical simulations to understand complex invisible fluid behavior, fluid force and energy loss of engineering systems. Although it is difficult to describe all fluid phenomena solely through theoretical analysis of the governing equations, theory provides an essential foundation for understanding fundamental mechanisms and predicting fluid behavior. Experimental approaches—such as flow visualization using smoke or dye, velocity measurements using Particle Image Velocimetry (PIV), and observations with high-speed cameras—may be limited by measurement techniques and experimental conditions and accuracy. Nevertheless, they are indispensable for capturing real flow fields. Numerical simulations, known as Computational Fluid Dynamics (CFD), allow researchers to reproduce conditions that are difficult to measure experimentally or analyze theoretically. While verification and validation of simulation methods and results are required, CFD is particularly effective for investigating complex flows, including turbulent pipe flows and gas–liquid two-phase flows. By using these methods in a balanced and complementary manner, fluid engineering enables the prediction and verification of fluid phenomena and supports the design of fluid machinery, improvements in efficiency, and reductions in energy loss.



Why Is Fluid Engineering Important?

Fluid engineering is essential because fluids play a fundamental role in daily life, industry, and social infrastructure. Energy systems such as wind and hydropower convert energy of air and water into electricity by machines, while thermal power plants depend on fluid flow and heat transfer in their cooling systems. Fluid engineering also supports efforts to reduce energy losses and aerodynamic drag in automobiles and aircraft, improving fuel efficiency. In addition, it underpins the design of fluid machinery such as pumps and turbines, as well as infrastructure systems including water supply, wastewater treatment, and gas distribution. Beyond industrial applications, fluid engineering contributes to medical and bioengineering fields, including blood flow simulations for disease prediction and the development of artificial organs. Its broad applicability makes fluid engineering a key technology for both modern society and future innovation.

What Future Developments and Applications Are Expected?

Future advances in fluid engineering are expected through AI-enhanced simulations, new measurement technologies, and advanced data analysis. These innovations will improve understanding of complex fluid phenomena and enable more efficient machine designs and development. Fluid engineering will also play a key role in emerging technologies and sustainable energy systems, contributing to solutions for global environmental challenges.