HU-ACE NEWS LETTER

Advanced Core for Energetics, Hiroshima University

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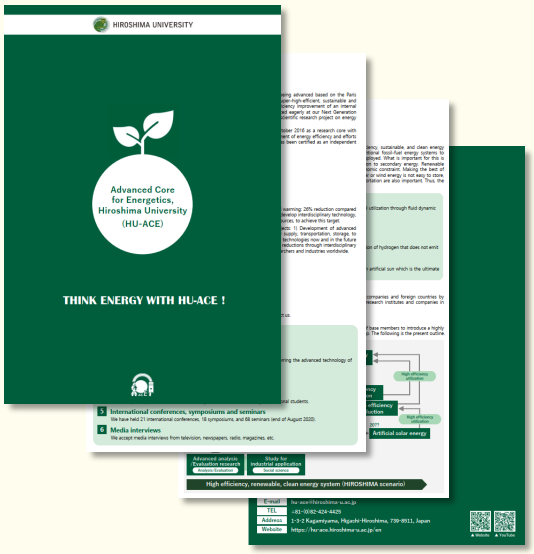
Activities of the Core

Mar. 1, 2021	The 1st Hiroshima University Biomass Premium Evening Seminar (co-organized)
Mar. 9, 2021	The 23rd Biomass Project Research Center Symposium (co-organized)
Mar. 17, 2021	Society for the Hydrogen energy and Next-generation energy Utilization ～ Seminar 2020 vol.2 (co-organized)
Mar. 22, 2021	The 57th HU-ACE Steering Committee Meeting

We have created a pamphlet and a slide template for HU-ACE.

As part of our efforts to make our activities known to many people, following the creation of a promotional video, we made a pamphlet and a slide template for HU-ACE. The theme color is "Hiroshima University Green", the color of the emblem of Hiroshima University. The design was inspired by the image of Earth and based on our activities of "research and development for the realization of highly efficient, sustainable, and clean energy systems." We plan to distribute the pamphlets and use the slide templates at conferences and events. We hope that you will take a look at the pamphlet and watch the presentation using the slide template.



■ **Pamphlet of HU-ACE**

■ **Slide template of HU-ACE**

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Member Introduction No.28

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Research Field: Plasma engineering
Keywords: plasma measurement, turbulence, tomography

Abstract

Elucidating plasma turbulence using imaging measurement

Background: Plasma turbulence hampers fusion power development

Fusion power generation is being developed as a clean and safe energy source. Fusion power plants use a strong magnetic field to confine high-temperature plasma, which is called magnetic confinement fusion. Seven countries (Japan, EU, US, Russia, China, Korea and India) are collaborating to build a huge fusion facility, ITER, that aims to exhibit the feasibility of magnetically confined fusion power production.

It has been found that, inside the magnetically confined plasmas, the turbulence degrades the confinement of the fuel particles and, on the other hand, induces large scale eddies to reduce turbulent transport. The interaction between turbulence at different scales is called *the multiscale interaction* and this feature is viewed as the source of the complicated nature of turbulence in plasma, which has to be elucidated to make fusion energy development successful.

Observing whole plasma cross section using tomography

To elucidate the nature of multiscale interaction, it is necessary to simultaneously observe turbulent phenomena of various scales. For this purpose, we developed a tomography system that observes the entire cross-section of plasma with sufficient time resolution. The principle of the measurement system is the same as that of a CT scan, which can commonly be seen in hospitals. The tomography system enables us to obtain the spatial structure of density (or temperature) fluctuation every 1μs. Using the observed images and an analysis method that extracts the fluctuation from the series of images, we revealed the spatial profile and intensity of interaction of turbulence at different scales.

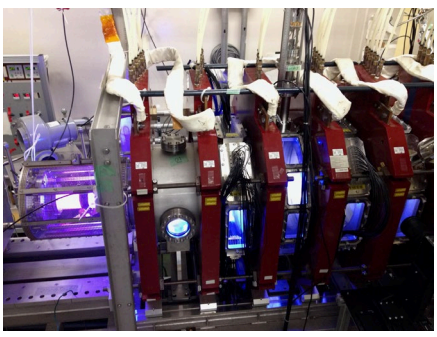

Figure 1: Linear magnetized plasma device

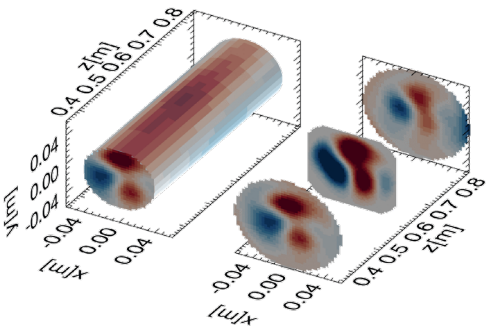

Figure 2: Three-dimensional structure using the tomography system

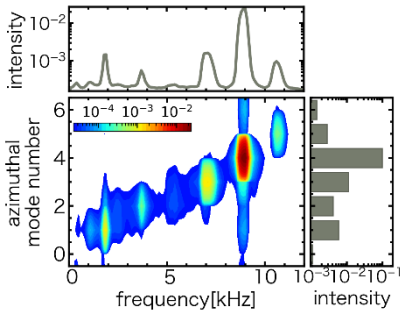

Figure 3: Spectrogram of turbulence observed by the tomography system

Papers C. Moon, K. Yamasaki, *et al.*, Sci. Rep. (2021), K. Yamasaki, *et al.*, RSI (2020), K. Yamasaki, *et al.*, JAP (2019)