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Michigan Institute for Plasma Science and Engineering

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Room 1311 EECS

Prof. Ken Hara

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Dynamics of Low Temperature Magnetized Plasmas: Self-Organization and Anomalous Electron Transport

Low-temperature magnetized plasmas are found in many systems, including plasma processing, space weather, and spacecraft propulsion. Two phenomena that are poorly understood in cross-electric and magnetic field plasma sources, such as magnetrons and Hall effect thrusters, are: (i) self-organized structures and (ii) anomalous electron transport across the magnetic field lines. In this talk, I will present the development of physics-based modeling, including fluid moment models and high-fidelity kinetic models, to address these processes. The fluid moment model coupled with improved boundary condition treatments is applied to low-temperature magnetized plasmas. The particle-based kinetic models are used to investigate multidimensional plasma turbulence initiated by a combination of kinetic instabilities in cross-field configurations. I will also introduce data-driven modeling using optimization and state estimation techniques applied to dynamical plasma systems.

About the Speaker: Ken Hara is an Assistant Professor of Aeronautics and Astronautics at Stanford University. He received his Ph.D. in Aerospace Engineering and Graduate Certificate in Plasma Science and Engineering from the University of Michigan in 2015, and B.S. and M.S. in Aeronautics and Astronautics from the University of Tokyo in 2008 and 2010, respectively. He was a Visiting Research Physicist at Princeton Plasma Physics Laboratory as a Japan Society for the Promotion of Science Postdoctoral Fellow. He is a recipient of several awards, including the Air Force Young Investigator Program Award, the Department of Energy Early Career Award, and the Office of Naval Research Young Investigator Program Award.