MPIDS Colloquium

MAX-PLANCK-GESELLSCHAFT

Extreme Magnetoconvection

Prof. Oleg Zikanov

Department of Mechanical Engineering
University of Michigan-Dearborn,
USA

Extreme magnetoconvection is the thermal convection in an electrically conducting fluid (for example, a liquid metal) that occurs in the presence of an imposed magnetic field. We analyze this phenomenon computationally with the focus on the case of very strong static fields (the Hartmann number up to 10^4) and strong heating (the Grashof number up to 10^{12}). Our goals are to understand the nature of the flow and to explore the implications for the design of liquid metal blankets of tokamak fusion reactors and other liquid metal systems. It is found that, as the intense Joule dissipation of induced electric currents suppresses conventional turbulence, the flows begin to demonstrate extreme, unusual and counter-intuitive behaviors, such as slow oscillation of remarkably high amplitudes, quasi-two-dimensional chaotic regimes, or exponentially growing elevator modes.

Wednesday, February 22nd, 2017 at 2:15 pm

MPIDS, Prandtl lecture hall, building AI, Am Faßberg 11, Göttingen

Max Planck Institute for Dynamics and Self-Organization
Theory of Turbulent Convection Group
PD Dr. Olga Shishkina
Email: olga.shishkina@ds.mpg.de, Phone: +49-(0)551/5176-335
Am Faßberg 17, 37077 Göttingen, Germany