Department of Mathematics
University of Notre Dame

PDE, COMPLEX ANALYSIS AND DIFFERENTIAL GEOMETRY SEMINAR

Guest Speaker: Jiahong Wu
Oklahoma State University

Date: Friday, May 5, 2023
Time: 11:00 AM
Location: 127 Hayes-Healy Hall
Zoom URL: NA

Lecture Title:
Stabilizing phenomenon for electrically conducting fluids

Abstract

Physical experiments have observed a remarkable stabilizing phenomenon: magnetic field can stabilize electrically conducting fluids. This talk presents two results that establish this observation as mathematically rigorous facts on the magnetohydrodynamic (MHD) equations. The first result is for a 3D incompressible MHD system with anisotropic dissipation. Without the magnetic field, the fluid is not known to be stable. But any perturbation near a suitable background magnetic field governed by this MHD system is shown to be asymptotically stable and decay algebraically in time. The second result concerns the 3D inviscid heat conductive compressible MHD system. Without the magnetic field, the fluid is governed by the 3D compressible Euler equations. Solutions of the Euler equations can blow up in a finite time even when the initial data are smooth and small. However, this compressible MHD system is shown to be stable and decay near any background magnetic field satisfying a Diophantine condition.

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