Department of Mathematics Seminar

Control and Stabilization in Magnetic PDE Systems

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Abstract: Magnetic partial differential equation (PDE) systems arise in physical models where magnetic fields interact with mechanical or fluid dynamics. In such systems, magnetic diffusion - described by a parabolic magnetic equation - is coupled with the evolution of solids or fluids, leading to challenging problems in controllability and stabilization. In this talk, we discuss control mechanisms for magnetic PDE systems and how the structure of the underlying physical model influences the choice of control techniques. Particular emphasis will be placed on magnetohydrodynamics (MHD), where the dynamics of an incompressible viscous fluid are coupled with the evolution of a magnetic field in two- and three-dimensional settings. The coupled fluid-magnetic interactions may generate complex dynamics, including turbulence and instabilities. We present results on the stabilization of the MHD system using localized finite-dimensional feedback controls acting on the coupled fluid-magnetic equations. These controls yield local exponential stabilization of the nonlinear system near an equilibrium state.

Date: Wednesday, March 25, 2026
Time: 17:00
Place: Mathematics Seminar Room, SA-141

Light refreshments will be served prior to the seminar.