On the Cauchy problem for the Hall-MHD equation

Abstract

In this talk, I will describe recent work with I.-J. Jeong on the Cauchy problem for the Hall-MHD equation without resistivity. This PDE, first investigated by Lighthill, is a one-fluid description of magnetized plasma with a quadratic second-order correction term (Hall current term), which takes into account the motion of electrons relative to positive ions. We demonstrate both ill and wellposedness of the Cauchy problem depending on the initial data. Central to our proofs is the viewpoint that the Hall current term imparts the magnetic field equation with a quasilinear dispersive character.