

Lecture 1. Compressible MHD equations as a dissipative system

We introduce the compressible MHD equations and show they generate a dynamical system dissipative in the sense of Levinson. This means there is a bounded absorbing set in the natural energy space. The system is thermodynamically open, driven by inhomogeneous boundary conditions. The result is conditioned by a proper concept of weak solutions and several compatibility conditions to be satisfied by the boundary data

Lecture 2. Weak solutions to the compressible MHD equations

We sketch the proof of existence of global in time weak solutions to the compressible MHD system. The concept of weak solution is new accommodating the effect of the thermal and magnetic boundary conditions of Dirichlet type

Lecture 3. Ergodic properties of the compressible MHD system

Based on the results presented in the preceding two lectures, we discuss the validity of the so-called ergodic hypothesis in the context of the compressible MHD system. We introduce statistical solutions and show the existence of stationary statistical solutions and invariant measures supported on omega-limit sets of trajectories.