

# The Magneto Rotational Decay Instability

Michael Mond

Ben-Gurion University

The magneto-rotational-instability (MRI) is considered by many researchers to provide a viable solution to one of the fundamental problems of theoretical astrophysics, namely, how turbulence arises and angular momentum is transported in accretion disks. A novel non-dissipative saturation mechanism of the MRI that is based on resonant as well as non-resonant three-wave interaction is introduced and discussed. Such mechanism relies on the energy transfer from the MRI to stable slow Alfvén-Coriolis (AC) as well as Magnetosonic (MS) waves. A second order generalized forced Duffing equation is derived that describes the dynamical evolution of the amplitude of the MRI. The solutions of that equation exhibit bounded nonlinear oscillations for the MRI along side unbounded growth for the linearly stable AC and MS modes, thus giving rise to the magneto rotational decay instability.