Contribution ID: **24** Type: **not specified**

Magnetohydrodynamics of planet-disk interaction

Friday 8 August 2014 09:00 (30 minutes)

The interaction of a planet with a viscous hydrodynamic disk has been well studied in the literature. However, protoplanetary disks are not viscous hydrodynamical flows. Rather, they are inviscid (in the dead zone), or they are turbulent (where the magnetic field couples to the gas). We present some recent studies of the interaction of low-mass planets with both inviscid hydrodynamical disks, and turbulent MHD disks. We find that even a low mass planet can open gaps in both cases due to nonlinear wave steepening, in contradiction to the "thermal criterion" for gap opening. Comparison with previous results from net toroidal flux/zero flux MHD simulations indicates that the magnetic field geometry plays an important role in the gap opening process. We also report on the discovery of a new source of torque in planet-disk interactions associated with buoyancy waves excited when the equation of state is not modeled using the isothermal approximation. Finally, we report on efforts to include non-ideal MHD processes such as ambipolar diffusion and the Hall effect on the MHD of planet-disk interaction.

Author: Prof. STONE, James (Princeton University)

Presenter: Prof. STONE, James (Princeton University)

Session Classification: Friday Morning

Track Classification: Workshop Main Programme