Abstract Submitted
for the APR09 Meeting of
The American Physical Society

Rossby Vortex Instability associated with Gaps in Disks[1] CONG YU, HUI LI, SHENGTAI LI, Los Alamos National Lab — We study the stability of a thin (2D) and nonmagnetized accretion disk with a dip/gap structure. This is motivated by the studies that a massive protoplanet can induce a dip/gap in a protoplanetary disk. Using linear theory analysis, we show that such a gap is unstable to nonaxisymmetric modes. We have performed 2D nonlinear disk simulations to confirm our linear analysis. Vortices are found to be generated at both edges of the dip/gap.We also include the effects of disk viscosity and planet in our simulation. We find a critical value of viscosity, larger than which, the vortex instability would be suppressed. This explains why many previous simulations did not observe such an instability. The inclusion of a planet does not affect the initial exponential growth phase of the instability but it does influence the non-linear saturation of the instability. The existence of these vortices could have important implications for understanding the planet migration rate, eccentricity and asymptotic mass of the planet.

[1]Laboratory Directed Research and Development Programs at Los Alamos and the Institute for Geophysics and Planetary Physics

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Date submitted: 24 Dec 2008 Electronic form version 1.4