

## Viscous Overstability in Saturn's Rings

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Viscous overstability is physically an oscillatory instability of viscous Keplerian shear flow. For given conditions, the interplay of viscous stress and coriolis force leads to the formation of waves in the density and velocity profiles of the disk. Overstability has been suggested to generate small scale structure on the 100m length scale in dense planetary rings, such as Saturn's A and B rings. Now strong hints at such small scale structure are indeed found in recent Cassini data from RSS (Marouf, talk presented in this session) and UVIS (Colwell et al, Icarus 2007), which cannot be attributed to gravitational wakes. Moreover, very regular structure of km length is evident in the high resolution ISS images from the SOI phase in the B ring (Porco et al 2005) and in the A ring.

Overstability seems a promising candidate to explain these data. But further analysis and modeling is needed to verify the idea. In this talk we review basic aspects of viscous overstability from theory and simulations. Of principal interest for comparison to observation is the role of self-gravity. On the one hand self-gravity might induce gravitational wakes on top of regular overstable waves. On the other hand self-gravity puts an upper limit on the dominant wavelength of overstability, an effect that was already noted by Schmit and Tscharnuter 1999.