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The role of Self-Gravity in Saturn's rings

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Abstract

The important role of self-gravity for shaping the local structure of Saturn's rings has been strikingly demonstrated by the Cassini stellar and radio occultation measurements, which indicate the presence of trailing self-gravity wake structures throughout the A and B rings. This confirmed the earlier expectations, based on the azimuthal brightness asymmetry observations. I will discuss the numerical modeling of ring self-gravity, addressing the strength and pitch angle of wakes, and the associated gravitational viscosity (including factors like internal density and elasticity of particles, size distribution, and geometric optical depth), and whenever possible, connect simulation results to observations (dependence of optical depth and reflected/ transmitted brightness on ring elevation and azimuth). The interplay of self-gravity wakes with overstable oscillations and satellite density waves is also discussed.

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