

Effect of Disk Self Gravity on the Type I migration

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We carry out hydrodynamic simulations of a proto-planetary disk with an embedded low-mass proto-planet in order to investigate the effect of self gravity of the disk on the migration velocity of the planet. For the disk model, we adopt power functions for the surface density profile and the temperature profile. We investigate the dependence on various parameters, such as the exponents of power functions of temperature and surface density, disk mass, and planet mass. We find that, without self gravity, the dependence of the surface density gradient on the migration rate is qualitatively agree with the linear analysis of Tanaka, Takeuchi and Ward 2002, but the absolute migration velocity is slower than the linear analysis. With self-gravity cases, the migration velocity is slightly faster than that of non-self-gravity case. This research is supported by the Ministry of Education, Culture, Sports, Science and Technology (MEXT 16077202).