

The Effect of Magnetic Turbulence on the Formation and Evolution of Circumplanetary Disks

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We investigate the importance of magnetic turbulence in the evolution of circumplanetary disks. Satellites with almost circular orbits nearly on the equatorial planes of the central planet are called regular satellites. Circumplanetary disks are supposed to be the formation sites of regular satellites. In order to understand satellites formation, we have to understand the evolution of circumplanetary disks. However, the mechanism of gas accretion in circumplanetary disks are poorly known, and thus, the gas accretion rate and the surface density of circumplanetary disks are very uncertain. The most promising mechanism of gas accretion is the magnetorotational instability (MRI), but the size of MRI-active region depends on the density structure of the disk. To understand the overall evolution of circumplanetary disks, we have to analyze the early formation phase of the disk where the matter is continuously provided by the infall from protoplanetary disks. In this work, we calculate the surface density evolution of the disk by solving the alpha-model equation of accretion disk with this infall onto the disk, and we calculate the ionization degree with the method we have developed in Fujii et al. (2011) and estimate the activity of MRI in circumplanetary disks. We find that MRI is not active in most of the phases of the evolution of circumplanetary disks.

Keywords: circumplanetary disks, magnetic turbulence, satellite formation