# Distribution of captured planetesimals in circumplanetary disks and implications for accretion of regular satellites

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Regular satellites of giant planets are formed by accretion of solid bodies in circumplanetary disks. Planetesimals that are moving on heliocentric orbits and are sufficiently large to be decoupled from the flow of the protoplanetary gas disk can be captured by gas drag from the circumplanetary disk. In the present work, we examine the distribution of captured planetesimals in circumplanetary disks using orbital integrations. We find that the number of captured planetesimals reaches an equilibrium state as a balance between continuous capture and orbital decay into the planet. The number of planetesimals captured into retrograde orbits is much smaller than those on prograde orbits, because the former ones experience strong headwind and spiral into the planet rapidly. We find that the surface number density of planetesimals at the current radial location of regular satellites can be significantly enhanced by gas drag capture, depending on the velocity dispersions of planetesimals and the width of the gap in the protoplanetary disk. Using a simple model, we also examine the ratio of the surface densities of dust and captured planetesimals in the circumplanetary disk, and find that solid material at the current location of regular satellites can be dominated by captured planetesimals when the velocity dispersion of planetesimals is rather small and a wide gap is not formed in the protoplanetary disk. In this case, captured planetesimals in such a region can grow by mutual collision before spiraling into the planet, and would contribute to the growth of regular satellites.

Keywords: planets and satellites

 