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Accretion of close-in super-Earths: effect of halting type I migration near the disk edge

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Since the first super-Earth Gl 876d was discovered in 2005, observations have been revealing several close-in super-Earths mainly by high precision radial velocity surveys. Orbital elements of them, especially multiple super-Earth systems, can constrain their formation scenario to some extent. Close-in planets are generally considered to originate on somewhat distant region and migrate toward the star, however, how planetary embryos pile up in the vicinity of the star has not been understood yet. In this talk, we present a new mechanism, eccentricity trap, for halting type I migration near the disk inner edge. We find that the eccentricity damping force due to disk-planet interaction on the innermost embryo near the disk edge plays a role of large angular momentum transfer from the disk to the convoy of resonantly interactiong embryos. Furthermore, we derive semianalytical formula for the condition of eccentricity trap through orbital calculations and predict how many embryos can be trapped, which can be applied not only to close-in super-Earths but also to the other systems (e.g., Galilean satellites).

Keywords: super-Earths, formation