Accretion of Vertically Stirred Small Bodies in the Protoplanetary Disk onto Circum-Planetary Disks

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High-resolution hydrodynamic simulations show that most of gas accretion onto circumplanetary disks occurs nearly vertically toward the disk surface from high altitude. For better understanding of the formation of giant planets and their satellites, we examine accretion of solid bodies vertically distributed in the protoplanetary disk onto the circumplanetary disk under the influence of such accreting gas flow. We use the distributions of density and velocity of the gas obtained by hydrodynamic simulation in calculating gas drag and integrate orbits of solid particles initially placed above the mid-plane of the protoplanetary disk. We find that small particles that cannot accrete onto the circumplanetary disk when they are initially confined in the mid-plane can accrete with the help of the vertically accreting gas. Accretion rates of small particles depend on their vertical scale-height in the protoplanetary disk. Our results indicate that vertical stirring of particles in the protoplanetary disks would be important for the supply of solid particles onto circumplanetary disks.

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