Dust radial transport by radiation pressure from inner rim of disks: The effect of turbulent diffusion

Daisuke Fujiwara[1]; Sei-ichiro Watanabe[2]

[1] Earth and Environmental Sci., Nagoya Univ; [2] Earth and Planetary Sci., Nagoya Univ.

In the standard scenario, a dust transport in protoplanetary disks is important for evolution of solid materials. In particular, the dust transport from the disk's inner rim that is a high temperature region may provide the important information in two following questions.

The first question is how do planetesimal form. The planetesimal formation occurs through coagulation of the dust particles in the protoplanetary disks. However, the meter-sized particles rapidly fall into a central star due to gas drag force before the planetesimal formation.

The second question is where do high-temperature materials in a meteorite and comet come. While the parent body of the meteorite and comet are formed in the outer region of the disk, high-temperature materials are formed in the inner region of the disks.

Therefore, we suggest a following dust circulation process: at the inner rim, falling dust particles partially evaporate and break up into fine grains, which are stirred up to the irradiated surface layer by magnetorotational instability (MRI) and blown outward by radiation pressure. The blowing particles reenter into the disk interior and settle toward the midplane. Most of the blowing particles reenter into the disk interior and settle to the midplane, joining inwardly-migrating dust particles.

In this presentation, we report the effect of turbulent diffusion for the dust circulation.