P136-009 **Room: 304** **Time: May 22 9:13-9:26**

Final mass of gas giant planets

Takayuki Tanigawa[1]; Masahiro Ikoma[2]

[1] Tokyo Tech.; [2] Earth Planet. Sci.
Tokyo Tech.

We construct a simple analytic model for the gas accretion rate onto a planet embedded in a protoplanetary disk as a function of planetary mass, disk viscosity, temperature, and unperturbed surface density in order to study the long-term mass evolution of gas giant planets and the final mass.

We first show surface density profile near the planetary orbit and construct the gas accretion rate onto the planet using an empirical formula for the accretion rate based on hydrodynamic simulations. Using the accretion rate, we calculate the mass evolution and the final mass of the planets based on the local disk properties. We then consider the planet's evolution in viscous-evolving global disks to calculate the final mass as a function of semi-major axis of the planet position for various disk models. We find that the disk can be divided into three region based on the limiting process for the final mass.

At inner region (inner than about 1AU), planets grow quickly and form a deep gap to suppress the growth by itself before disk dissipation. The final mass of the planet in this region is proportional to square root of semi-major axis. At intermediate region (from 1AU to 100AU), viscous diffusion of the disk limits the gas accretion before the planet form a deep gap. The final mass can be up to the disk mass, depending on the relationship between disk dissipation timescale and viscous evolving timescale. At outer region (outer than 100AU), planets cannot capture significant amount of gas within the lifetime of the disk. We also investigate how the disk properties affect the final mass of the planets and the boundary positions of the three region.