N28a 3D SPH Simulations of Viscous Disk Evolution around Be Stars

○岡崎敦男 (北海学園大工)

Be stars are rapidly-rotating, non-supergiant early-type stars which have equatorial disks at least on one occasion. They can change themselves to B stars and back to Be stars again by losing the disk and then reforming it. Although there is no widely-accepted model for Be star disks, the viscous decretion disk model by Lee, Saio & Osaki (1991) explains many of the observed features and thus seems promising. The model assumes that the star can eject gaseous particles with the Keplerian velocity at the stellar equator. The ejected particles then gradually move outward by viscosity and form a disk. In this model, the angular momentum is given by the central star and transported outward by viscosity. It is important to note that such a disk cannot be steady. The disk grows when the star exerts a positive torque on it (Okazaki et al. 2002), whereas it is expected to decay when no/negative torque is exerted.

In this paper, we study the effect of the intermittent torque by the star on the Be star disk, using a 3D smoothed particle hydrodynamics code and turning on and off the mass ejection from the star. It is shown that, after the mass ejection is shut off, the innermost part of the disk begins to accrete and the accreting part gradually propagates outward. It is also shown that the Be disk in misaligned binaries precesses in a retrograde sense when no mass is supplied from the star. Our simulation reveals that, if the mass supply is resumed for such a disk, an inner disk is formed with its rotation axis misaligned with that of the outer disk and that the outer disk rapidly changes its direction to that of the inner disk.