N09a Global disk oscillations in binary Be stars (II) Effect of density distribution

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Be stars are early-type (i.e., hot) stars surrounded by gaseous equatorial disks from which the optical emission arises ("e" is for emission). Many Be stars exhibit long-term, quasi-cyclic variations in emission-line profiles (hereafter, V/R variations), which are caused by global one-armed oscillations in the equtorial disk. Although many binary Be stars shows V/R variations, only oscillation modes in the equatorial disk around single Be stars have been theoretically studied.

At the 2007 Fall ASJ meeting, we have reported the effects of the companion on the characteristics of global one-armed modes in the disk of binary Be stars. In the study, we have assumed the equatorial disk to have a power-law density distribution without a gap between the star and the disk. From the observations, however, some Be stars exhibit evidence of formation and decay of the equatorial disk. In the decaying phase, the disk is lost from the innermost part, which results in a gap between the star and the disk. In such a disk, we expect that the density distribution is not of power-law type and is highly peaked near the inner edge of the disk.

In this study, we investigated global one-armed modes in binary Be star disks which have density distribution consistent with the decaying Be disk. We find that the eigenmodes have positive frequencies (i.e., prograde modes) and are confined to the inner part of the disk. We compare the results with the results obtained for Be disk with power-law density distribution. We also discuss the evolution of the one-armed modes, comparing the curent results with the observed behavior of binary Be stars in the decaying-disk phase.