N18a Global disk oscillations in binary Be stars

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Be stars are early-type (i.e., hot) stars surrounded by gaseous, equatorial disks. Many Be stars exhibit long-term quasi-cyclic variations in emission-line profiles, which are caused by global oscillations in the equatorial disk. So far, only oscillation modes in the equatorial disk around single Be stars have been studied, but there are many binary Be stars showing long-term, line-profile variations. In this paper, we study the tidal effect of the companion on the global oscillation modes in the equatorial disk around binary Be stars with circular orbits. For simplicity, we assume the equatorial disk to be inviscid and isothermal. We also assume that the disk is truncated at the 3:1 resonance radius, where the rotation frequency of particles are three times as high as the orbital frequency of the binary. We investigate the effects of the orbital separation and the binary mass ratio as well as the rotational deformation of the Be star. We find that the eigenmodes have positive eigenfrequencies and are confined to the inner part of the disk only if the tidal effect or the rotational deformation of the Be star is very strong. Otherwise, the modes have negative eigenfrequencies and propagate over the whole disk. The absolute value of eigenfrequency decreases with increasing orbital separation, while the eigenfrequency increases (if it is negative, the absolute value decreases) with increase of binary mass ratio and/or rotational deformation of the star. We also briefly discuss the effect of boundary conditions on the mode characteristics.