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APSIDAL MOTION IN BINARY SYSTEMS AS A TOOL FOR DETERMINATION OF STELLAR MASSES: SYSTEM HD 93205 (O3V+O8V)

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Apsidal motion equation is used as an additional equation that allows to determine the masses of components of non-eclipsing binaries if a set of evolutionary models and the rate of apsidal motion are provided. We apply this method to HD 93205 (O3V+O8V), the primary being a candidate to be a very massive star.

Morrell et al. (2001) derived an apsidal motion rate of $\dot{\varpi} = 0\overset{\circ}{.}0324 \pm 0\overset{\circ}{.}0031$ per orbital cycle for HD 93205. If we assume that the components of a binary have the same age and if the internal structure constants and the radii of the components can be obtained from a theoretical set of isochrones, then the apsidal motion equation can be rewritten in terms of the mass of the primary M_1 only. Then solving this equation for each isochrone allows us to obtain M_1 as a function of age (Benvenuto et al. 2001).

HD 93205 is a highly eccentric system ($e = 0.37$) suggesting that it is very young so we use this to constrain the range of ages from 0 Myr up to 2 Myr. We find that M_1 ranges from 60 $M_\odot$ at 0 Myr down to 42 $M_\odot$ at 2 Myr and the secondary from 25 $M_\odot$ down to 17 $M_\odot$ (see Fig. 1), which is in good agreement with other determinations for O8V stars in eclipsing binaries (Andersen & Clausen 1989).

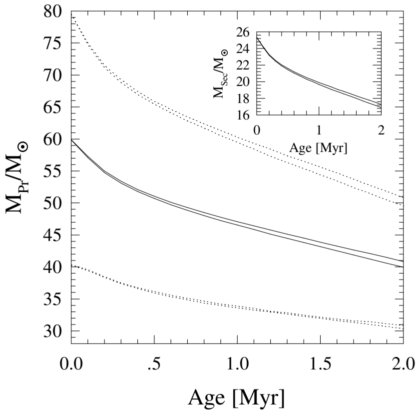

Fig. 1. Mass of the O3V component of HD 93205 as a function of age for $\alpha_{ov} = 0.25$ and 0.4 (solid lines) and 1 σ errors. The inset shows the mass of the secondary.

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