YY SGR - COMPUTER MODEL OF AN ECLIPSING BINARY STAR

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So far, we've used the TwoStars program (included in Carroll & Ostlie's Appendix K, with my own Maple translation for this problem available here) to model non-eclipsing binary star systems. It can also generate light curves for eclipsing binary systems, so as an example, we'll revisit YY Sgr. [If you want to run the Maple code to generate your own light curve, note that the calculation of the eclipsing portions of the curve can take quite a while (a few minutes on my machine, running on an Intel i7 processor) to run, so be patient; if the program appears to hang, just give it a while longer.]

The data for YY Sgr are $M_1 = 5.9 M_S$, $R_1 = 3.2 R_S$, $T_1 = 15200$ K, $M_2 = 5.6 M_S$, $R_2 = 2.9 R_S$, $T_2 = 13700$ K, $P = 2.6284734$ days, $e = 0.1573$, $i = 88.89^\circ$, $\phi = 214.6^\circ$ and velocity of the centre of mass is zero. The light curve is in Fig. 1.

The minima don't have flat bottoms, indicating that the eclipses are only partial, as we'd expect given that the radii of the two stars are similar and the inclination angle is far enough from 90° that only a partial eclipse occurs.

The radial velocities of the two components are shown in Fig. 2.

As the eccentricity is quite small, the radial velocities are nearly sinusoidal.

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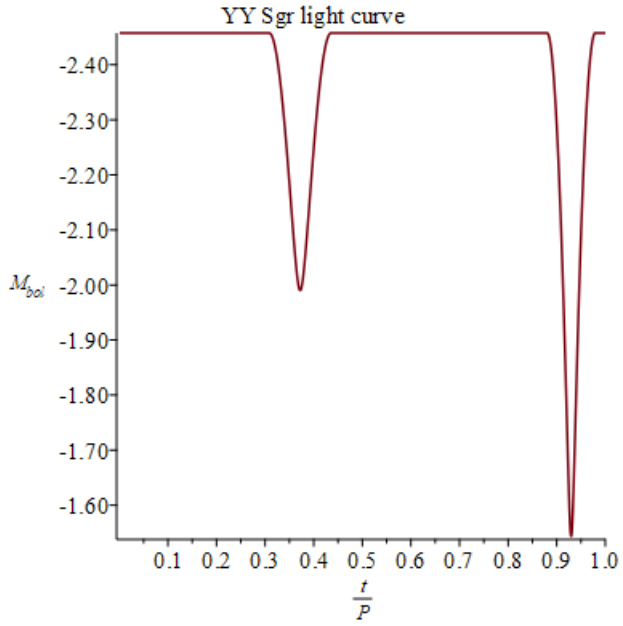

FIGURE 1. YY Sgr light curve.

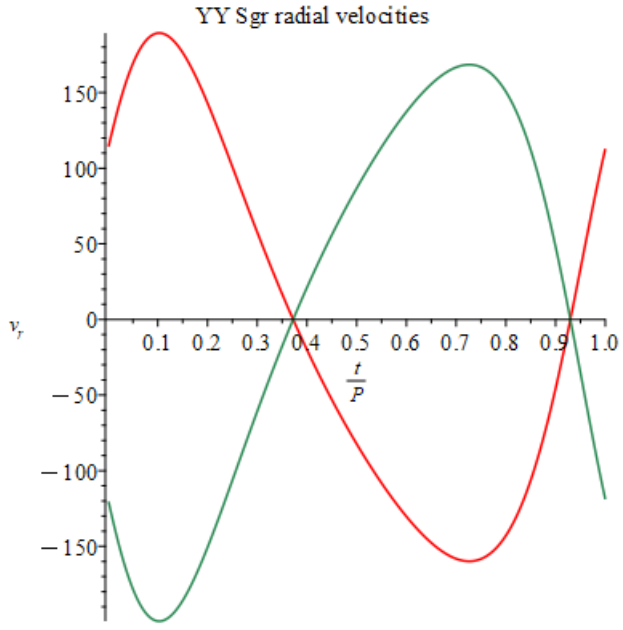

FIGURE 2. YY Sgr radial velocities.