

Title: Modelling of binary asteroids

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Abstract: I describe the model of binary asteroid for simulating long-period component of lightcurve with occultation and/or eclipse events. There is assumed a spherical shape for both components and an elliptical orbit of the secondary. With this model, I obtained possible ranges of secondary's orbital parameters and its size (secondary-to-primary size ratio R_s/R_p , sidereal orbital period P_2 , semimajor axis a/R_p , ecliptical coordinates of the orbit's normal λ_n and β_n , excentricity e , and length of pericenter ω) for two near-Earth asteroids: 1991 VH and 1996 FG₃. The parameters are estimated analytically from observed features in the lightcurve at first and than improved by numerical modelling. Possible ranges of the parameters in the best solution for asteroid 1991 VH are: $R_s/R_p = 0.37$ – 0.44 , $P_2 = (1.3589$ – $1.3600)$ d, $a/R_p = 4.65$ – 5.68 , $\lambda_n = 15^\circ$ – 185° , $\beta_n = 46^\circ$ – 86° , $e = 0.043$ – 0.060 , $\omega = 63^\circ$ – 94° . For 1996 FG₃: $R_s/R_p = 0.27$ – 0.32 , $P_2 = (0.6725$ – $0.6728)$ d, $a/R_p = 2.98$ – 3.48 , $\lambda_n = 176^\circ$ – 331° , $\beta_n = 87^\circ$ – 58° , $e = 0.005$ – 0.026 , $\omega = 21^\circ$ – 344° . For both asteroids, there are other solutions which simulate the lightcurves almost equally well.

Keywords: binary asteroids, modelling of lightcurves