Research of lightcurves of the real binary asteroids

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The technique of obtaining the elements of satellite orbit and effective diameters of components of binary asteroid from lightcurves was improved. In particular, it is possible to evaluate the inclination of the satellite orbit from assimetry of lightcurve obtained during satellite transit. The research of the lightcurves of asteroids 1991 VH, 1994 AW$_1$, 1996 FG$_3$ was fulfilled. The main component of binary system is approximated by ellipsoid with equal shortest inertia axises $(b = c)$. The satellite is considered as spherical. The main component rotates about axis perpendicular to longest inertia axis (a). Axis a is situated in satellite orbit plane. The ratio of the inertia axes of main component has been obtained by comparision of real lightcurves with simulated ones.

Obtained elements of satellite orbit have been used for simulation of lightcurves by the method developed by author. In this method the component surfaces are decomposed into small plane facets and illuminations produced on the Earth by each facet are summed up taking into account mutual occultations and eclipses of the components. The components are approximated by homogeneous triaxial ellipsoids.

For lightcurves simulation it is necessary to know the coordinates of the component centers and the direction cosines of the principal central inertia axes of the components in any moment of time. To obtain these values the problem of the components motion under the influence of the Sun and mutial gravitation is considered. The equations of prograde-rotational motion of binary asteroid are integrated by Everhart method.

As a result of this research the elements of the orbits of satellites and the form of main components of asteroids 1991 VH and 1994 AW$_1$ were estimated. Asteroid 1996 FG$_3$ seems to be contact binary.