ALBEDO OF THE TROJAN ASTEROID 4709 ENNOMOS. V. G. Shevchenko[1], I. G. Slyusarev[1], I. N. Belskaya[1], [1]Astronomical Institute of Kharkiv Karazin National University, Sumska Str. 35, Kharkiv 61022, Ukraine, shevchenko@astron.kharkov.ua

Introduction: Surfaces of comparatively large Jupiter Trojans with D>50 km usually have very low geometrical albedo [1,2,3,4] excepting only 4709 Ennomos. Fernandez et al. [1] obtained the geometric albedo about 0.15 from the thermal data for this asteroid. They assumed that the higher albedo of Ennomos is caused by an impact which uncovered a subsurface layer of pristine ice. Fernandez et al. [1] carried out synchronous observations in the visual and infrared bands. But since the observations were performed for nonzero phase angle they used the HG-function [5] with slope parameter G = 0.05 to obtain the absolute magnitude. As it was shown in [6,7] all measured Trojans show the linear magnitude-phase functions that cannot be well-fitted by the HG function. We investigate the question whether a high albedo of Ennomos can be explained by possible uncertainties in its absolute magnitude determination.

Results: We performed observations of Ennomos in 2010 and 2011 to determine its absolute magnitude more accurate. We obtained lightcurves, color indices, and determined rotation period that is close to the value obtained in [8]. The lightcurve of Ennomos has asymmetrical form with maximal amplitude equal to 0.45 mag (see Fig. 1). The shape of lightcurves is rather similar for all three observed oppositions with small differences in maximal amplitude. We obtained also the magnitude-phase relation in the range of phase angles 6-11 deg with the phase coefficient 0.045 mag/deg, that is close to other measured Trojans and to some very dark main belt asteroids [6,7]. It should be noted the aspect view in 2011 was close to that observed in [1]. When we use the linear fit to calculate absolute magnitude of Ennomos we obtained H=8.57 mag which is about 0.3 mag faintly as found in [1]. As it was shown in [9], an incorrect determination of absolute magnitude influences mainly albedo value. Using equation from [9] we obtained new albedo of Ennomos p_V = 0.12 that is lower as was obtained in [1].

In 2011 the size of Ennomos was estimated from stellar occultation that was observed by Euraster team. The ellipse fit to the occultation chords is 108×91 km (http://www.euraster.net/results/2011). We calculated the absolute magnitude of Ennomos H = 8.86 mag for the time of occultation using the measured magnitude and magnitude-phase curve for the same apparition. The moment of occultation was very close to the lightcurve minimum (see Fig. 1). Using the above-mentioned value of absolute magnitude and the mean occultation diameter we found that albedo of Ennomos is equal to 0.05.

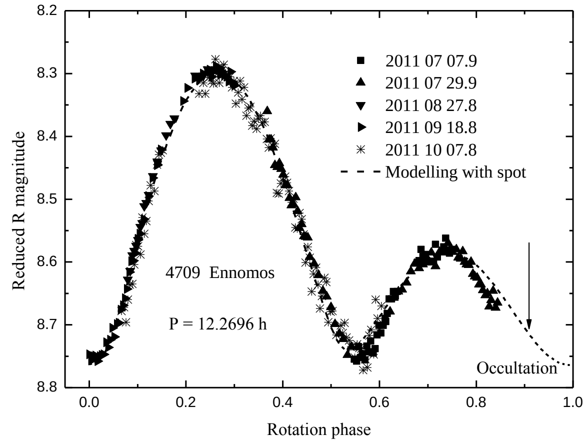

Fig. 1. Composite and modeled lightcurves of 4709 Ennomos with occultation moment.

Discussion and Conclusions: The occultation albedo is essentially different from the value obtained in [1]. If the V magnitude in [1] is correct it means that the observation of Ennomos was made near the lightcurve primary maximum. To explain asymmetrical form of the lightcurve we modeled an influence of albedo spot on the lightcurve and obtained that the bright spot with albedo of 0.25 should occupy about 30% of the visible surface area near the primary maximum. Such spot can be detected by spectral methods, although Yang and Jewitt [10] did not report spectral variability of Ennomos. At present we have no enough data to say what part of Ennomos surface they observed. Alternatively, an asymmetrical form of Ennomos lightcurve can be explained by a complex shape.

There are few other estimations of Ennomos albedo from the thermal data [2,3,4] which are lower than found in [1]. On the basis of available data we assume that Ennomos has dark surface but a bright spot cannot be excluded. To confirm finally it the new observations are needed, first of all to search for spectral variations with the rotation.

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