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Photometry of dark asteroid (439) Ohio

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"Low-albedo asteroids are predominantly located on the outer part of the main belt and consist of the most primitive matter formed in the early stages of the formation of the Solar System. A detailed study of their surface structure and mineralogical composition can provide insight into the processes that formed the planets and other celestial bodies in our Solar System. One of the important characteristics that makes it possible to study the surface structure of asteroids and their optical properties is the magnitude-phase dependence. Only between of low-albedo asteroids there is a diversity of magnitude-phase dependences, especially in the region of the opposition effect (nonlinear increasing brightness at small phase angles), which indicates significant features in the surface structure of these bodies. Some of P and D-asteroids have no opposition effect, which means that their brightness is linearly down to very small phase angles. These objects, according to their spectra, represent the most primitive matter in the Solar System, which is characterized as very dark and contains organic materials. However, data on such asteroids are extremely insufficient, and further research of their surface properties is necessary to better understand their peculiarities.

This research focuses on the photometry of the asteroid (439) Ohio, a low-albedo asteroid with a slow rotation period. The aim of the work is to determine the rotation parameters of the asteroid, to improve the methods for determining the rotation period of slowly rotating asteroids and to obtain the magnitude-phase relation of this asteroid. The study involves processing of images obtained from CCD observations of the asteroid in V and R filters over 20 nights in 2020, to obtain asteroid lightcurves and absolute magnitudes. The rotation period of the asteroid was specified, equal to 37.4888 hours, and a composite lightcurve of the asteroid with an amplitude of 0.25 mag was constructed. This lightcurve has be used to obtain the resulting qualitative magnitude-phase dependence of the asteroid in the V and R filters, which do not show a nonlinear increasing brightness in the region of opposition effect.

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