276786 (2004 KD1) ASTEROID OBSERVATIONS

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Abstract. *This paper presents the results of the observation of asteroid 276786 (2004 CD1), a certain period of rotation of the asteroid around its axis for a given season and the phase curve of the light.*

Keywords: *aphelion, albedo, filter, amplitude.*

Amurs are a group of near-Earth asteroids whose orbits are completely outside the Earth's orbit (Fig. 1), that is, at perihelion the distance from the Sun is greater than the aphelion distance of the Earth, but 1.3 AU. less than (1.017 AU <q<1.3 AU) (JPL). Thus, even at the closest point of their orbit, these asteroids are further from the Earth, including when the Earth is located at the aphelion point (Fig. 2.). The name of the Amur group was given in honor of the first representative of this group, asteroid (1221) Amur, discovered in early March 1932 (MPC). Currently, the number of asteroids in this group is 12,615 (JPL). Cupids, like other representatives of near-Earth asteroids, are relatively small in size. There are only four known Amurs with diameters of more than 10 km. The largest of them (1036) is Ganymede, almost 32 km in diameter (JPL). The second largest asteroid with a diameter of about 19 km (3552) Don Quixote is one of the darkest known asteroids with an albedo of about 3% (JPL).

276786 (2004 KD1) was first discovered on May 18, 2004 at the Catalina Observatory. It orbits the Sun at an average distance of 1.719 AU. The perihelion point of its orbit from the Sun is located at a distance of 1.151 AU, and the farthest aphelion point is located at a distance from the Sun of 2.287 AU. Its eccentricity is 0.33 and its period of revolution around the Sun is 2.25 years. Its absolute magnitude is 17.28, and its diameter is 1.720 kilometers (Nugent, C. R. etal., 2016).

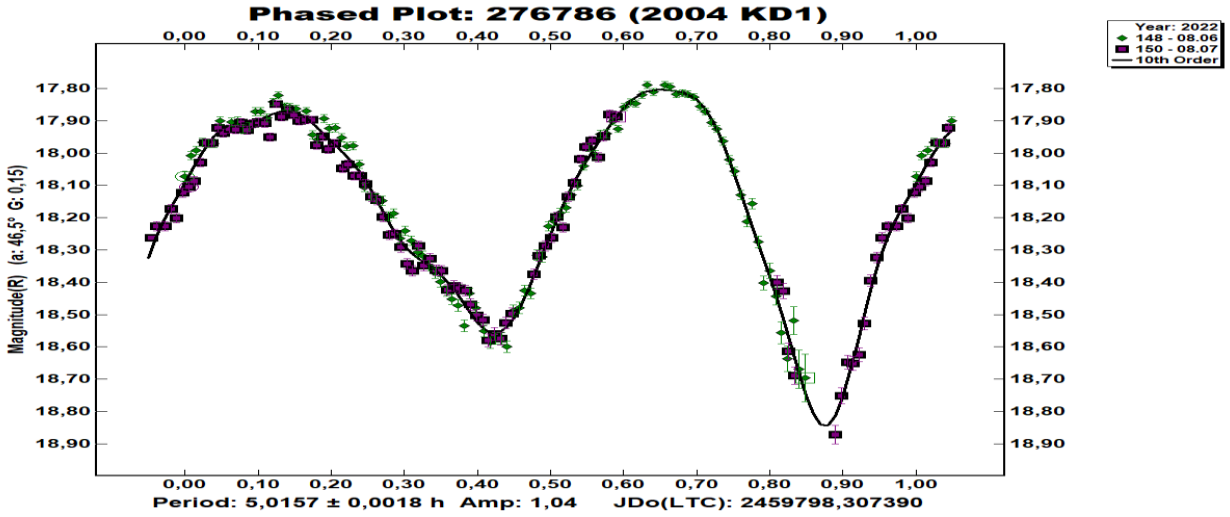

Figure 1. Phase light curve of 276786 (2004 KD1) for August.

Asteroid 276786 (2004 KD1) was observed from August 6 to September 26, 2022 at the Maidanak Observatory. 6 nights of observations were carried out, 2 nights in August and 4 nights in September. As a result of the analysis of observational data of this object obtained in August, its rotation period was determined, which turned out to be equal to 5.0157 ± 0.0018 hours (Fig. 1.). The amplitude of the brightness change in the R filter along the phase curve turned out to be equal to 1.04 magnitude, while the angle between the Sun-Asteroid-Observer was taken to be 46.5 degrees and the tilt parameter G=0.15.

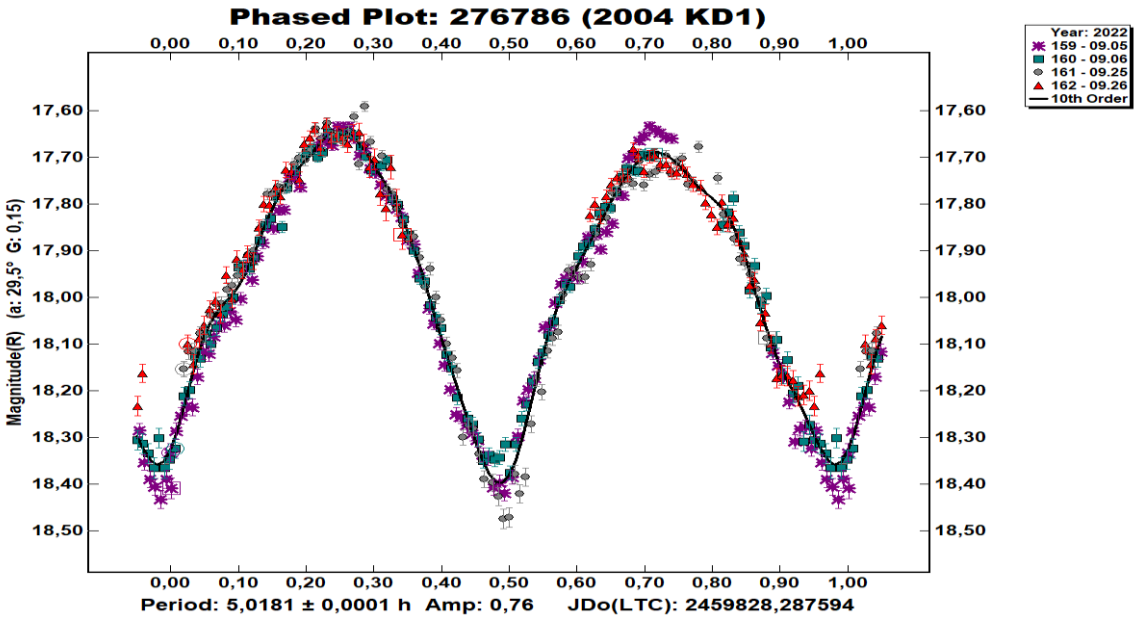

Figure 2. Phase light curve of 276786 (2004 KD1) from observations made in September.

Analysis of series of observational data relating only to September showed that the period of rotation of the asteroid around its axis is 5.0181±0.0001 hours (Fig. 2.). And the amplitude of oscillations in the R filter was 0.76 magnitudes with the Sun-Asteroid-Observer angle of 29.5 degrees and the Slope parameter set to G=0.15.

Having analyzed the observational data, one can notice that during the observations in August and September, the angle between the Sun-Asteroid-Observer changed by almost 17.5 degrees, and as a result, the position of the asteroid's rotation axis in space relative to the observer on Earth also changed, which led to a difference in rotation period and change in the variability amplitude equal to 0.28 magnitude. led

Analysis of observational data in the form of a single time series showed that the period of rotation of the asteroid around its axis for this observation season is 5.0176. ±0.0001 hours (Fig. 3.). In this case, the angle between the Sun-Asteroid-Observer
is 46.5 degrees for all data.

When studying the rotation period of asteroid 276786 (2004 KD1), the rotation period values determined by Waszczak, A. (2015) give a result of 5.018 hours. However, NASA estimates that the possible error in this result could be up to 30 percent (ssd.jpl.nasa.gov).

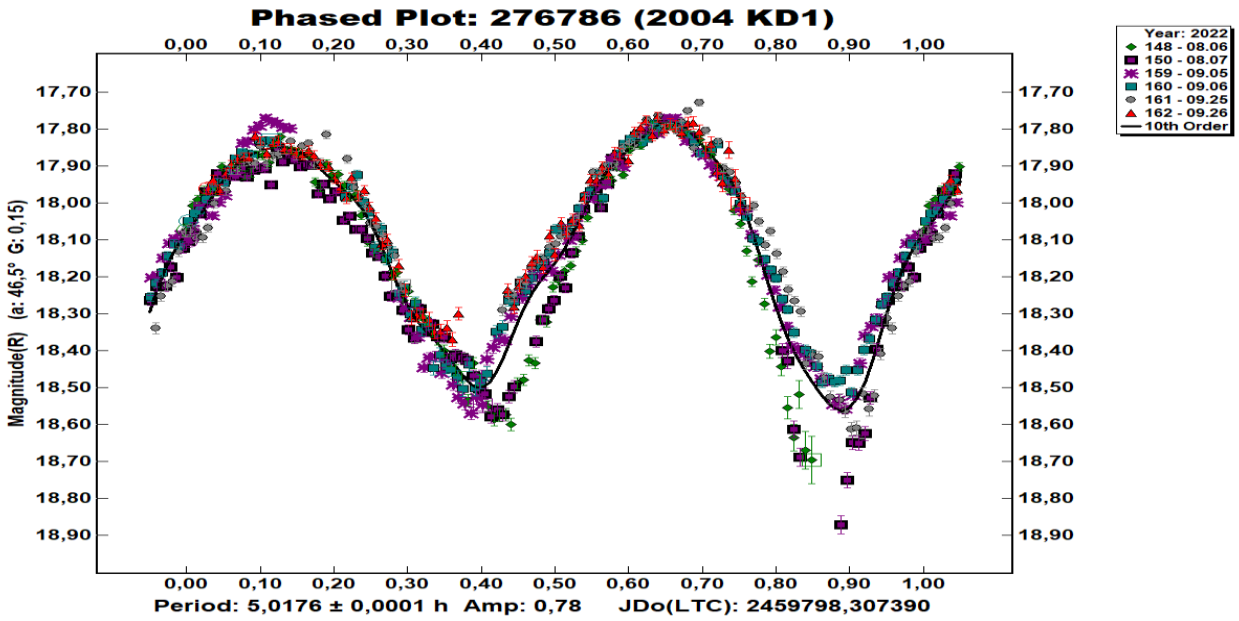

Figure 3. Phase light curve of 276786 (2004 KD1) constructed based on all data obtained.

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