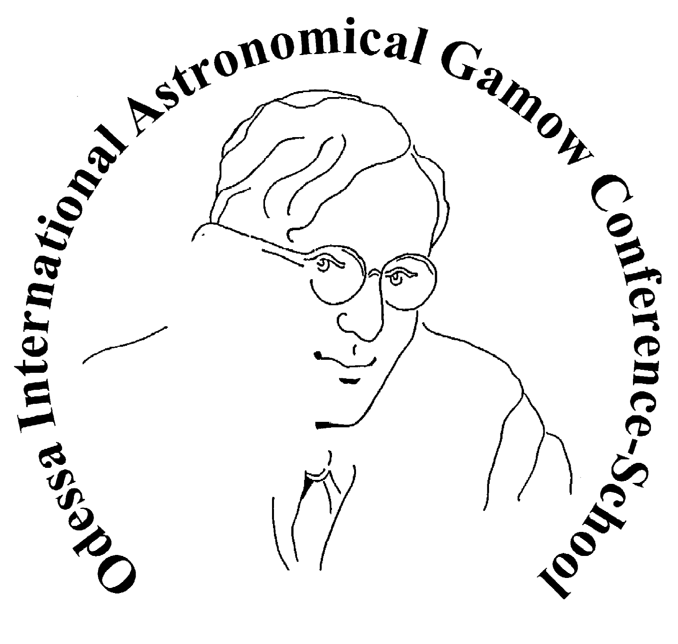
22-nd Gamow International Astronomical Conference

"ASTRONOMY AND BEYOND: ASTROPHYSICS, COSMOLOGY AND GRAVITATION, ASTROPARTICLE PHYSICS, RADIO ASTRONOMY AND ASTROBIOLOGY"



ABSTRACTS

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Англійською та українською мовами

that maximize the differences between the light curves of 3D geometric primitives as a result of their rotation [1] to various methods of the light curve inversion and the use of machine learning methods and neural networks [2, 3, 4]. However, there are not many published works in which these methods are applied to specific RSOs and direct estimates of their rotation parameters are obtained. Previously, we considered the method and fundamental possibility of directly estimating the rotation parameters of RSO, which exhibit specular flashes, based on multisite photometry [5]. The proposed method is aimed at quickly obtaining the angular velocity and direction of rotation of the RSO without any restrictive assumptions about its shape. However, the question is what are the chances of registering a single flash at several observation sites. In this paper, we explore the possibility of using the existing wide network of observatories (on the example of Ukraine) to solve this problem.

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TIME AND GEOLOCATION UNCERTAINTIES AS COMPONENTS OF THE ACCURACY OF NEAS GROUND-BASED OBSERVATIONS

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Statistical analysis of the IAU MPC observational array of the small Solar system bodies and the development of a scheme for assigning weights to individual observations are important for performing asteroid orbit determination and refinement. Errors in the positions of asteroids associated with errors in the reference catalogs, observation epoch, observed brightness and rate of motion are considered in sufficient detail in the works of Chesley et al. (2010), Farnocchia (2015), Veres et al. (2017). Residual differences (O – C) in the equatorial coordinate system are usually used to search and identify functional dependencies. But in the case of observations of NEAs, especially at the moments of close approaches to the Earth, timing errors and errors in the observatory's geolocation can significantly affect the accuracy of the obtained positions. To detect such errors, instead of residual differences (O – C) in equatorial coordinates, it is more convenient to use along-track and cross-track residual differences (O – C) of positions of the observed object. Here we present the simulation results of such errors and analysis using an array of observations from 3 observatories for the period 2017 – 2022. The array contains more than 17,000 positions of about 900 objects, most of which are NEAs, including PHA, and objects during periods of the close approaches to the Earth.

PROCESSING OF ARTIFICIAL SATELLITES PHOTOMETRY OBTAINED BY THE QHY-174M-GPS CAMERA AND SYSTEMATIZATION OF THE DATA

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We presente our attempt to use the QHY174M-GPS camera for the photometry research of artificial objects. This device is useful for imaging occultations, eclipses, meteors, and so on due to a highly precise recording of the time (GPS-based) and location of the observation on every frame and fast readout of the CMOS detector. The precision of time registration by the QHY174M-GPS camera is at the level of microseconds.

All light curves obtained by studied camera during observations of artificial satellites in this work were carried out at Derenivka Observatory of Uzhhorod National University, Ukraine. The created photometric system with QHY174M-GPS camera as the detector and reflector telescope with parameters D=120 mm, F=228 mm, FOV=2.82″x1.76″ was calibrated. For target observations, SharpCap software was used. For the purposes of photometry processing, ccd-phot software was developed using Python 3.8 programming language with astropy and photutils packages. Photometry observations of artificial satellites of the Earth and standard stars were carried out. Over 263 lightcurves of artificial satellites were obtained.

For the storage and data systematization we also develope website that abale user to revise resulting LC. This site contain also observations from our second photometer in Uzhhorod. At this moment we already have collected over 1600 LC in B,V and R filters.