

Spin determination of AJISAI from photometric observation at Hitotsubashi University

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The Japanese Experimental Geodetic Satellite (AJISAI) was launched by National Space Development Agency (NASDA), currently reorganized as Japan Aerospace Exploration Agency (JAXA), on 12/Aug/1986 (year 1986.6137). The mission objective is accurate position determination of fiducial points on the Japanese Islands. This fully passive satellite is equipped with 1436 corner cube reflectors (CCRs) for SLR and 318 mirrors arranged in form of 15 rings around the symmetry axis. The mirrors are used for spin determination of AJISAI. The photometric system at Hitotsubashi University determines epoch times of flashes caused by sunlight, and reflected by the dedicated mirrors of AJISAI to the detection system.

Fast spinning AJISAI (about 2 seconds per revolution) glints three times per revolution thus giving accurate information about its spin. The spin period is calculated as a time between reflections given by the same mirror. The spin period value is corrected by the apparent effects which are caused by station - satellite mutual motion. The data obtained by the photometric system allows calculation of the spin period ($T=2.111043$ s, 18th Dec 2009) with accuracy of about 0.35 ms.

Knowledge of AJISAI's spin is important for physical modeling of the space forces acting on this body. It can help to investigate the gravitational and non-gravitational effects perturbing motion of the passive satellites and improve accuracy of precise orbit determination.

Spin determination of AJISAI is essential for the next generation time transfer - transmission of laser pulses between SLR stations via AJISAI mirrors to compare time scales at the picosecond level.

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