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# AUTOMATIC ANALYSIS OF LIGHT-CURVES VARIABILITY OF ORBITAL OBJECTS

**Abstract**

When a satellite loses control or when it is decommissioned, its attitude can change with time. The evolution of the attitude period is investigated by studying rapid changes in brightness as possible implication of rapid changes in attitude. This paper deals with the short-term brightness variability of uncontrolled orbiting objects that is analyzed by taking observations with the University of Michigan's 0.6m Curtis-Schmidt telescope located at the Cerro Tololo InterAmerican Observatory (Chile) and the 1.5m Cassini telescope in Loiano (Italy), operated by the INAF (National Institute for Astrophysics) Astronomical Observatory of Bologna. While the telescope is tracking at the sidereal rate, the target trails across the field of view (FOV). Consequently, the object appears in the figure as bright streak in the middle of the frame, with stars appearing as points. The exposure time is typically 15 seconds or longer. Analysis of intensity changes along the trail reveals the object's brightness variations on time scales of a second or less. To determine the main frequencies of the objects, an automatic pipeline has been developed to process independently all images and the identification of the frame's objects is based on edge detection algorithm and morphological image analysis. The accuracy of the measurements of the flash peaks relies on the streak ends recognition process to avoid systematic error the variability analysis of the streaks. The object's frequencies are extracted from light curves by using Fourier analysis (Fast Fourier Transformation). Due to the need of equally spaced data in time, this process implies limitation of the frequency resolution. For this reason, the results are compared with other methods to estimate the spectral density of the light-curve signal.