CONTROL ID: 2565692

TITLE: Asteroid spin and shape modelling using two lightcurve inversion methods

ABSTRACT BODY:
Abstract (2,250 Maximum Characters): We are conducting an observing campaign to counteract strong selection effects in photometric studies of asteroids. Our targets are long-period (P>12 hours) and low-amplitude (a_max<0.25 mag) asteroids, that although numerous, have poor lightcurve datasets (Marciniak et al. 2015, PSS 118, 256). As a result such asteroids are very poorly studied in terms of their spins and shapes. Our campaign targets a sample of around 100 bright (H<11 mag) main belt asteroids sharing both of these features, resulting in a few tens of new composite lightcurves each year. At present the data gathered so far allowed to construct detailed models for the shape and spin for about ten targets.

In this study we perform spin and shape modelling using two lightcurve inversion methods: convex inversion (Kaasalainen et al. 2001, Icarus, 153, 37) and nonconvex SAGE modelling algorithm (Shaping Asteroids with Genetic Evolution, Bartczak et al. 2014, MNRAS, 443, 1802). These two methods are independent from each other, and are based on different assumptions for the shape.

Thus, the results obtained on the same datasets provide a cross-check of both the methods and the resulting spin and shape models. The results for the spin solutions are highly consistent, and the shape models are similar, though the ones from SAGE algorithm provide more details of the surface features. Nonconvex shape produced by SAGE have been compared with direct images from spacecrafts and the first results for targets like Eros or Lutetia (Batczak et al. 2014, ACM conf. 29B) provide a high level of agreement.

Another way of validation is the shape model comparison with the asteroid shape contours obtained using different techniques (like the stellar occultation timings or adaptive optics imaging) or against data in thermal infrared range gathered by ground and space-bound observatories. The thermal data could provide assignment of size and albedo, but also can help to resolve spin-pole ambiguities. In special cases, the thermal data from Spitzer and Wise/NEOWise might even help in testing specific shape features via thermal infrared lightcurves.

CURRENT * CATEGORY: Asteroids: Observational Surveys

CURRENT : None

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