

Could the NEA dynamics reveal existence of the Yarkovsky effect?

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The Yarkovsky effect is a subtle non-gravitational phenomenon related to the anisotropic thermal emission of solar system objects. Its importance has been recently demonstrated for the transport of material from the main asteroid belt (both for explaining the origin of the near-Earth asteroids and some properties of meteorites) and also in relation to the aging-processes of the asteroid families. However, unlike the case of artificial satellites, the Yarkovsky effect has never been measured or detected in the motion of natural bodies in the solar system. Here, we investigate the possibility of detecting the Yarkovsky effect via the precise orbit determination of certain near-Earth asteroids. Though the current data do not clearly demonstrate the Yarkovsky effect in the motion of these bodies, we predict that the next apparition of several asteroids (in particular Golevka, Geographos and possibly Icarus) might reveal its existence. Moreover, we show that the Yarkovsky effect may play a very important role in the orbit determination of small, but still observable, bodies like 1998 KY26. If carefully followed, this body may serve as a superb probe of the Yarkovsky effect in its next close approach to the Earth in June 2024.