

On the orbit deflection of potentially hazardous binary asteroids

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The binary asteroid (65803) Didymos, target of the Asteroid Impact & Deflection Assessment (AIDA) mission, belongs to the dynamical class of Potentially Hazardous Asteroids (PHA). In the framework of AIDA, a kinetic impact (DART) is intended to change the orbit of Didymos' moonlet around the binary's center of mass. The aim is to change the mutual orbit of the binary asteroid. However, net momentum is also imparted on the whole system. The consequent change in the asteroid's velocity will change the heliocentric orbit of the Didymos system as well. Even if those changes are expected to be small, they can affect long term predictions of the encounter distances between Didymos and the Earth. In order to make sure that no planetary safety issues arise as a consequence of such a kinetic impact, post-mitigation impact risk assessments (PMIRA, Eggl et al. 2015, 2016) similar to those already performed for the deflection demonstration scenarios elaborated in the framework of the European Commission funded NEOShield projects are necessary. An essential part of the PMIRA is the evaluation of uncertainties in the deflection process, the dynamical model, as well as their influence on the final change and the consequences for long term impact risk assessment. We discuss the role of several subtle differences in the dynamical behavior of binary asteroids as compared to single asteroids with respect to the post mitigation impact risk assessment of the AIDA mission.