



Dynamics of ejecta from the binary asteroid Didymos, the target of the AIDA mission

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The AIDA space mission, a collaborative effort between ESA and NASA, aims to characterize the near-Earth asteroid binary (65803) Didymos and to perform a kinetic impactor demonstration on the small moon of the binary system. Our study presents a multi-scale dynamical model of the ejecta cloud produced by a hypervelocity impact, which enables us to compute the ejecta properties at different spatial and time scales. This model is applied to the impact into the small moon of Didymos on October 2022 as considered by the AIDA mission. We model the process by including as much practical information as possible, e.g., the gravitational environment influenced by the non-spherical shapes of the bodies (based on the observed shape of the primary), the solar tides, and the solar radiation pressure.

Our simulations show where and for how long the ejecta cloud evolves with time for the considered ejecta initial conditions. This information is used to assess the potential hazard to the ESA Asteroid Impact Mission (AIM) observing spacecraft and to determine the safest positions.

This study is performed with support of the European Space Agency and in the framework of the NEOShield-2 project that has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 640351.