

Modeling the impact of the DART kinetic impactor on Didymos-B

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Abstract

The upcoming Double Asteroid Redirection Test (DART) NASA mission is the first demonstration of a kinetic impactor with the goal of creating a detectable deflection. DART will strike the ~160m diameter secondary in the Didymos binary asteroid system in 2022, which should create a measurable change in the orbit of the secondary around the primary based on ground observations. Modeling of the impact and its outcome is an important component in understanding the resulting deflection, particularly any enhancement due to ejecta from the cratering process. In this talk we will present a suite of models performed by the Planetary Defense Group at Lawrence Livermore National Laboratory (LLNL), including: studies of impacts in rubble-pile structures and the importance of local topography; impact angle effects due to either the asteroid shape or impacting off the center of figure of the target; variations in the cratering and deflection accounting for realistic spacecraft shape models.

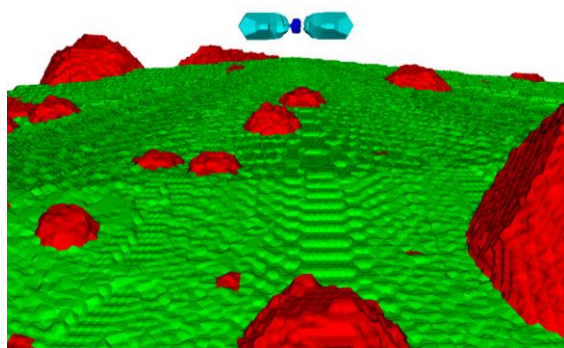


Figure 1 A spacecraft model about to impact into a boulder field realization of Didymos B.

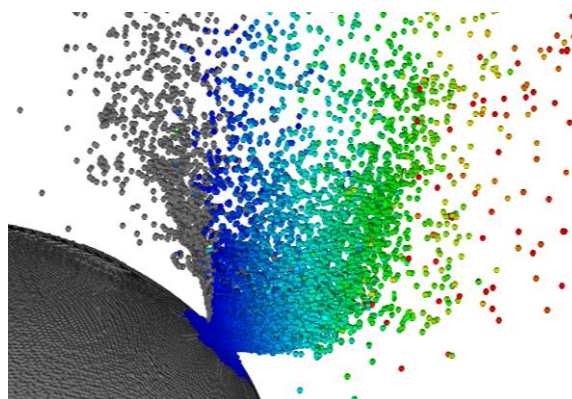


Figure 2 Example of an oblique impact on Didymos B, with the resulting anisotropic ejecta curtain.

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