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**Differences in Nuclear Deflection Scenarios with Oddly Shaped Asteroids**

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**ABSTRACT**

Traditionally the starting point for any calculation of the impulsive deflection of an asteroid is to approximate the asteroid as a sphere. This approximation will capture a significant fraction of the effects expected to occur during a nuclear deflection attempt, and indeed provides very useful scoping data within parameter sets surrounding radiation type and spectrum, as well as material type and composition. However, one also needs to understand how an asteroid with a non-spherical shape will affect the deflection attempt, as all potentially hazardous objects contain some degree of asphericity.

In this talk several simulations of nuclear deflection on non-spherical objects will be discussed. Instead of attempting to model specific cases in full detail (an endeavor which would be not only be computationally daunting but would leave one with a gap in understanding the relationship between general shape aspects and deflection) we focus on modeling several idealized cases that span a set of general object shapes and features, while maintaining a constant choice of object material and size and the same standoff nuclear deflection scenario. Three major classes of idealized situations will be analyzed.

First, elliptical asteroids with varying degrees of ellipticity will be shown. This will include spherical up through an object with a ratio of semi-major to semi-minor axes of four. For completeness, objects that are closer to pancake shaped down to a ratio of one-half will also be examined. Second, spherical asteroids with one or more boulders of varying sizes will be examined. This set of objects will allow for the exploration of 'shadowing' effects due to the boulder, where parts of the underlying

asteroid surface do not see the nuclear blast due to the presence of the boulder. Third, asteroids with a surface crater of various sizes will be explored. The discussion will conclude with a description of implications for characterization and optimization strategies.

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