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Near Earth Asteroid Characterization for Threat Assessment

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ABSTRACT

Physical characteristics of NEAs are an essential input to modeling behavior during atmospheric entry and to assess the risk of impact but determining these properties requires a non-trivial investment of time and resources. The characteristics relevant to these models include size, density, strength and ablation coefficient. Some of

these characteristics cannot be directly measured, but rather must be inferred from related measurements of asteroids and/or meteorites. Furthermore, for the majority of NEAs, only the basic measurements exist so often properties must be inferred from statistics of the population of more completely characterized objects.

The Asteroid Threat Assessment Project at NASA Ames Research Center has developed a probabilistic asteroid impact risk (PAIR) model in order to assess the risk of asteroid impact. Our PAIR model and its use to develop probability distributions of impact risk are discussed in other contributions to PDC 2017 (e.g., Mathias et al.). Here we utilize PAIR to investigate which NEA characteristics are important for assessing the impact threat by investigating how changes in these characteristics alter the damage predicted by PAIR. We will also provide an assessment of the current state of knowledge of the NEA characteristics of importance for asteroid threat assessment. The relative importance of different properties as identified using PAIR will be combined with our assessment of the current state of knowledge to identify potential high impact investigations. In addition, we will discuss an ongoing effort to collate the existing measurements of NEA properties of interest to the planetary defense community into a readily accessible database.

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