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CONCURRENT ENGINEERING METHODOLOGY FOR A NEAR EARTH OBJECT IMPACTOR MISSION

Nate Byerly[1], Shannon Fry[2], Robert Kellogg[3], Hope Marks[4], Dominick Montero[5], Nathaniel Park[6], Nikka Pelayo[7], Aaron Reaves[8], Stephen Scheuerle[9]

[1][2][3][4][5][6][7][8][9]*The Aerospace Corporation, 2310 E. El Segundo Blvd. El Segundo, CA 90245*

[8]*Georgia Institute of Technology, North Ave NW, Atlanta, GA 30332, (404) 441-0363 reavesam@gmail.com*

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ABSTRACT

In recent years, the dangers that Near Earth Objects (NEO) pose to our planet have become more apparent. As we continue to survey our solar system, we are made aware of an increasing number of potentially hazardous asteroids against which we have few defenses. The heightened awareness of this threat has sparked an interest in the development of detection and deflection capabilities for such a scenario. The Aerospace Corporation has launched an initiative to study the engineering challenges of this mission type.

Concurrent engineering is a process methodology where design subsystems interact through shared data, allowing for new levels of collaboration and rapid trade space exploration. This paper details the creation of a concurrent engineering tool that allows for a team of subject matter experts to simultaneously work on a design for a NEO mission. This tool was produced by modifying several distinct engineering tools and combining their capabilities into one concurrent engineering model. These various tools and programs were combined in the Concurrent Engineering Methodology (CEM) tool, an in-house Aerospace Corporation tool that allows for a single systems engineer to perform conceptual designs for all of the subsystems of an earth-orbiting satellite mission. We added parameters and options to the existing CEM subsystem sheets to meet the requirements of a heliocentric trajectory and

asteroid interception. The new tool was utilized alongside several others, including the joint Jet Propulsion Laboratory and Aerospace Corporation NEO Deflection Application, to design a mission for a hypothetical asteroid impact scenario. The CEM tool expedited the design process and allowed exploration and evaluation of various designs for the Planetary Defense Conference 2017 scenario using several launch windows, asteroid attributes, and design requirements.