

## **A PRELIMINARY RELIABILITY ASSESSMENT OF A CANDIDATE EUROPA ORBITER PROPULSION SYSTEM**

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### **Abstract**

This paper discusses a probabilistic reliability assessment of a candidate propulsion system of a Europa Orbiter (EO) spacecraft that was considered for launch in 2008. The objectives of this study were to provide additional insight into key propulsion system reliability issues and to recommend, if possible, other propulsion system design options that might have the potential to improve system reliability. The EO propulsion system, being developed by Lockheed Martin Astronautics (LMA) under the direction of the Jet Propulsion Laboratory (JPL), is a new, high-performance storable nitrogen tetroxide/hydrazine, active pressure regulated, bi-modal spacecraft propulsion system design that is required to meet the challenging long-life, multiple burn, large change in velocity, direct 2008 EO mission requirements. Science Applications International Corporation (SAIC), with the cooperation of LMA and JPL, developed a probabilistic-based reliability model and applied it to the baseline 2008 mission case. The propulsion system design, currently well into the preliminary design stage of development, was found to be an excellent starting point from which to make an accurate preliminary reliability assessment of this candidate EO subsystem design. Much discussion in this paper focuses on the formulation and application approach in performing this assessment. This includes detailed discussion of the reliability model that was developed as part of this study effort, as well as how supporting EO propulsion system design and mission information, and available component data are used to perform this analysis. At the paper's conclusion, preliminary EO propulsion system reliability assessment results are presented.

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