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TITLE OF PAPER: Options for Green Monopropellants

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Abstract

Recent commercial and government investments have resulted in substantial advances in the technology readiness of a number of new candidate "green" monopropellants, many of which have already completed, or will complete in the next few years, successful on-orbit demonstrations. These propellants are often touted as potential (and in some cases technology-level ready) replacements for conventional hydrazine. This paper will provide a comprehensive carefully considered set of screening criteria and then evaluate each of the emerging candidate "green" and the established flight-proven propellants against these criteria. Then a thorough and objective assessment of both the performance advantages and disadvantages as well as an assessment of the current "states of the art" and technology readiness levels for a number of these emerging "green" technologies as compared to each other and the incumbent hydrazine flight systems will be provided. Additionally, this paper contains a discussion of what it notionally means for a propellant to be "green", how definitions vary throughout industry, and the relative importance of "green-ness" to other performance, safety and handling considerations. Finally, results of these studies are used to provide a candid assessment of what types of missions are either enabled by or best suited to the demonstrated properties of the "green" monopropellants vs. established propellants and where cost and risk factors favorably align for near-term infusion into specific missions such as deep space missions requiring low freezing points, ESPA-class satellites with limited volume, and military and defense applications.