IAF SPACE PROPULSION SYMPOSIUM (C4)
New Missions Enabled by New Propulsion Technology and Systems (9)

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IANUS: AN OVERVIEW ON THE DEVELOPMENT AND TESTING OF MILANI MISSION PROPULSION SYSTEM

Abstract

IANUS is the six degree-of-freedom cold gas propulsion system that will enable Milani mission to carry out proximity operations around Didymos bynary asteroid system along with reaction wheel desaturation manoeuvres. Milani is a 6U CubeSat that will be piggyback-transported by HERA, a planetary defence mission funded by ESA, during the 2.5-year long interplanetary cruise. Milani is devoted to the visual inspection and dust detection of Dimorphos, Didymos' moon, after the NASA-led DART impact that is expected to happen in October 2022. Like the two-faces ancient Roman divinity from which it takes its name, IANUS propulsion system is composed of two 0.5U identical modules mounted on opposite sides, each one equipped with four independent nozzles, along with tank, fluidic system, and electronic

board. This choice has been made for two reasons: the first is to comply with Milani volume budget and shape, the second is to guarantee a full redundancy on the propulsion capability. The chosen propellant is the R134a, selected because it is a non-explosive, non-toxic, non-flammable fluid. In addition, given the bi-phasic nature of R134a, the tank pressure depends on the ambient temperature and will be limited to relatively low level (e.g., below 20 bar). An Engineering Qualification Model has been funded by ESA and involves a 10-month fast-track development project which started from preliminary design and will supposedly end with the environmental test campaign in Q3 2022. The aim of this paper is to provide an overview of the development and the results of the performance and environmental tests.