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SPACE PROPULSION SYMPOSIUM (C4)
New Missions Enabled by New Propulsion Technology and Systems (6)

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CREW WASTE WATER ELECTRIC PROPULSION SYSTEM DEVELOPMENT STATUS AND ITS ROADMAP IN 2012

Abstract

Since 2011, Earth-Track Corporation and Osaka Institute of Technology have been studying for new type of electric propulsion system what we call WEPS (Water Electric Propulsion System) by using "waste water" produced in a spacecraft because this new "reusable, ecological, green" propulsion system to resolve difficulty in perspective of re-fuel or cost saving is significantly important for the future manned space mission. First step of this study is to make a new DC arcjet thruster with all related systems. Last year we found that our exiting mass flow controller could not produce enough water flow to ignite firing continuously, so we have been developing thermal gas generator as a new flow product system. This paper will introduce current feasible study topics (system development, firing validation test results, and so on). Furthermore this paper will show the latest roadmap for WEPS. Basically, ISS is only way to test crew waste water transferring to WEPS for a certain period. We have a plan of developing a test payload and a small satellite using WEPS. These can be transferred to JEF (ISS/JEM Exposed Facility) from exposed pallet from Visiting Vehicle by using ISS robotic arm. This roadmap includes WEPS design development status especially to be considered such as water tank because water is not so easy to keep as a "liquid" and its heater should be required. Regarding this water tank, we also need to assess an orbital analysis transition trajectory for its water tank volume estimation to go to and return from the Moon (It's the longest distance we could assume in this roadmap). This roadmap also states how we should tie up with other companies or space agencies to succeed this project. JAXA HTV (H-II transfer Vehicle) is the most possible candidate for WEPS's launcher.