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THE CURRENT STATUS FOR CREW WASTE WATER ELECTRICAL PROPULSION SYSTEM BY
USING ARCJET THRUSTER**Abstract**

Since 2011, the technology have been studying for new advanced type of electric propulsion system what we call WEPS (Water Electric Propulsion System) by using “waste water” produced in a spacecraft. Our basic concept for this new advanced electric propulsion system is that modification with existing electric propulsion (DC Arc jet) system by changing its fuel. Regarding “water” as a propellant, we are planning to use the reclaimed waste water from Water Recovery System (WRS) in ISS Environmental Control and Life Support System (ECLSS) currently on orbit. The first major step of this study is to develop a new gas generator to provide H₂O gas to Arc jet. Per our experiment results so far, we found that our exiting mass flow controller could not produce enough water flow to ignite firing continuously due to H₂O liquid state. Recently, we succeeded to make new gas generator using heat “glow plug”. Per the latest our roadmap for WEPS, our final goal is to make a small satellite using WEPS and deploy from ISS. By way of demonstration on ISS for a test payload with minimized WEPS (Only Fuel Tank, DC Arc jet are implemented), a small satellite with all WEPS will be deployed from ISS. These can be transferred to JEF (ISS/JEM Exposed Facility) from exposed pallet from ISS Visiting Vehicle (HTV or Space-X DRAGON is possible candidate) by using ISS robotic arm. We also have been studying an orbital analysis to inject transferring orbit and reach some destination (e.g. Moon) after ISS deployment using this WEPS Arc jet.