Paper ID: 53747
oral

IAF SPACE PROPULSION SYMPOSIUM (C4)
Propulsion System (1) (1)

Author: Mr. Ulrich Gotzig
ArianeGroup, Germany

Mr. Malte Wurdak
ArianeGroup, Germany
Mr. Nicholas Harmansa
Institute of Space Systems, University of Stuttgart, Germany
Mr. Zachary Lynn
United States

WATER PROPULSION - THE ULTIMATE GREEN TECHNOLOGY

Abstract

When it comes to a replacement of toxic hydrazine for long term orbital missions all current replacement candidates have handling limitations because these propellants contain either highly energetic materials or are energetic themselves. Water propulsion, a system where the chemical energy is being produced from simple water via electric energy in orbit is a semi-electric propulsion that offers a high storage density and a high performance at nearly zero propellant cost. Semi-electric means that propellant generation over a long period and usage over a short period are decoupled and thus it allows operating the spacecraft with significant higher thrust levels and a specific impulse that outperforms even classical bipropellants. The easy handling and the low propellant cost leads to significantly reduced cost of operations where the satellites can be tested and shipped with the real propellants onboard. Water propulsion technology has been matured within ArianeGroup within the last years and this paper presents the actual development status of the 2 key components: a space electrolyzer that produces high pressure, phase separated gases in orbit and a thruster that is able to operate with the stoichiometrically produced GO2 and GH2 as propellants.