

IAF SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Technologies for Future Space Transportation Systems (5)

Author: Ms. DONG Xiaolin

China Academy of Launch Vehicle Technology(CALT), China, dongyinxiaolin@163.com

Mr. Kang GUO

China Aerospace Science and Technology Corporation (CASC), China, gkcasc@163.com

Dr. Xiaowei WANG

China Academy of Launch Vehicle Technology (CALT), China, wangxwbuaa@163.com

Mr. Shengbao WU

China Academy of Launch Vehicle Technology, China, wushengbao2003@163.com

Mr. Gao zhaohui

China Academy of Launch Vehicle Technology (CALT), China, mail.gaozhaohui@gmail.com

SYSTEM DESIGN AND SIMULATION ANALYSIS OF INTEGRATED VEHICLE FLUIDS

Abstract

The Integrated Vehicle Fluids system integrated the functions of tank pressurization, power generation, attitude control, and propellant settling in traditional cryogenic space transportation vehicles, effectively utilized the hydrogen and oxygen boil-off gases, eliminated the constraints of limiting the existing space vehicles to be long-term in orbit, such as hydrazine for the reaction control system, helium for the tank pressurization and large batteries, which realized long-term in-orbit of the cryogenic space transport vehicle, simplified and integrated the system, greatly improved the vehicle performance. Due to the important influences of the boil-off gases exhaust timing and pressurization modes and the boil-off rate to the system, this paper introduces different system designs. The corresponding systems are then simulated, which shows the system could reduce the whole system mass significantly. And the optimization suggestions such as the applying the continuously exhaust and increasing the boil-off rate appropriately are proposed.