

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

Author: Dr. Tien-Chuan Kuo
National Space Organization, Taiwan, China

Dr. Kun-Chang Tseng
National Space Organization, Taiwan, China

DEVELOPMENT OF A PROPULSION SYSTEM BY USING HYDROGEN PEROXIDE PROPELLANT

Abstract

To satisfy the mission requirement of the FORMOSAT-7 project, NSPO has initialized a self-reliant development on satellite propulsion technology. A trade-off study on different types of propulsion system has been done, and high-concentration hydrogen peroxide (H₂O₂ hereafter) propulsion system is chosen in this research because H₂O₂ is ITAR-free, nontoxic and easy to produce. As the components designed for either cold gas or hydrazine propulsion system are not suitable for H₂O₂ propulsion system, the primary objective of the research is to develop the components compatible with H₂O₂. By cooperating with domestic research institutes and manufacturing vendors, several prototype components, including the diaphragm-type tank, pressure transducer, ball latch valve, and thruster with catalyst bed, were manufactured, and the functional tests were performed successfully according to the mission requirements. The requisite environmental tests are scheduled to be performed in the future. Moreover, an air-bearing thrust stand (ABTS) and a real-time data acquisition control system (DACS) were implemented to assess the performance of the proposed H₂O₂ propulsion system. By measuring the distance that the thrust stand has traveled in a given time, the thrust force can be derived from the kinematics equation. To validate the feasibility of the approach, it is scheduled to assess the performance of a cold gas (N₂) propulsion system prior to the H₂O₂ propulsion system.