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Author: Mrs. Guo Manli  
Shanghai Institute of Space Propulsion, China, gmlisp6801@163.com

EXPERIMENTAL STUDIES OF THE 150N HAN-BASED MONOPROPELLANT ATTITUDE  
CONTROL THRUSTER

**Abstract**

The green propulsion is a promising area, especially the Hydroxylammonium Nitrate (HAN)-based monopropellant thruster which provides simple, safe, reliable, non-toxicity and high performance propulsion systems. Our institution has been studying the novel technology since 1999, and has made the first on-orbit operation of 1N HAN-based thruster applied on a Micro-nano satellite in the early 2018. Ongoing efforts continue to advance the technical state-of-the-art through improvements in the performance, life capability, and affordability of the HAN-based monopropellant thruster. Tests on the 150N thruster, such as the thermal and pressure, give the detailed data to analyze the corresponding between the pressure and related temperatures in the catalyst bed. All tests were carried out under vacuum conditions ( $<0.1$  mbar). An exhaust gas guidance system was used to lead the exhaust gases from the thruster nozzle to the vacuum reservoirs of the test facility. Therefore the thruster was constantly exposed to vacuum even in the thruster operating process to prevent the thermocouples from convection. The resulting data verifies that the 150N HAN-based thruster innovative design performs as theoretical analysis. The thruster can work without any pressure peak when the catalyst bed temperature is preheated to about  $120^{\circ}\text{C}$ , and can last more than 2000s accumulated firing time and 200s longest continuous operation time. In the next step, a series of improvements, not only the materials and processes, but also the effective resigned thruster configuration will be carried out.