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# HELICON PLASMA ELECTRIC PROPULSION WITH ADN PROPELLANT

**Abstract**

Helicon Plasma Electrical Propulsion, with its advantages in generating dense plasma using of different propellants efficiently in a magnetic field, has been investigated in many laboratories around the world. Double Layer Helicon Plasma Thruster (DLHT)[1], has been proposed and tested, although no flight modes have been put into operation in space up till now. Helicon Plasma Hydrazine is a combined micro-thruster concept[2] working with hydrazine propellant and electric power together for providing 1 mN of thruster to drive mini-satellite in space. In this work, a helicon plasma thruster, using ADN propellant (HPT-ADN) is designed and the experimental results are presented. The advantages of the ADN helicon thruster are clearly presented by the experimental results, larger thruster and higher specific impulse compared with normal DLHT helicon thruster, the internal chemistry-thermal energy of the ADN propellant would be released out under the helicon plasma catalyzation. The chemistry energy converts into particle's thermal and kinetic energy, and raises up the gas temperature. With the heating of the gas temperature, the discharge rate is greatly improved, and the combination rate dramatically decreased, the helicon plasma propulsion efficiency is in turn greatly improved by using the ADN propellant. The ionized exhaust are confined by the magnetic field, and ion thermal energy converts into its parallel energy due to the magnetic mirror configuration, and it would increase the thrust and efficiency of the electric propulsion. The propellant tank of the helicon plasma thruster can be shared with chemical thruster on the sample spacecraft, which would safe a large amount of mass. Finally ADN propellant is a green chemical compound and would be conservative for the environment.