

Abstract Submitted
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A permanent-magnet helicon thruster FRANCIS F. CHEN, UCLA
— Gridded ion thrusters are the classical method for propelling spacecraft to their designed orbital velocities. These thrusters generate electrons with a thermionic cathode and accelerate them with positive grids, creating a plasma. Ions are extracted from the plasma and accelerated with another grid and ejected from the spacecraft to propel it. An external electron source is used to neutralize the ion beam, preventing the spacecraft from charging up negatively. Hall thrusters also accelerate ions electrostatically, but the electrons are held back not by grids but by a magnetic field. A cool electron source is needed here also. Helicon thrusters eject neutral plasma, and the ions are given a kick in an external “double layer,” which forms as a sheath in free space. We have miniaturized a helicon thruster by using a permanent magnet over a small discharge tube. The ejected plasma is measured with a retarding-field ion analyzer. At low pressures, the RFID peaks around 27eV and can be increased by biasing the top plate, thus achieving a reasonable specific impulse.

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