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Characterization of an electrodeless ECR plasma thruster THO VIALIS, JULIEN JARRIGE, DENIS PACKAN, ONERA - The French Aerospace Lab, 91120 Palaiseau, France — Several advanced plasma thruster technologies are currently being studied for the 1-10 mN range. ONERA is developing an Electron Cyclotron Resonance (ECR) plasma thruster, whose main advantage is to produce a current-free plume. It does not need a neutralizing cathode, which is one of the most fragile component in electrostatic thrusters. The ECR thruster consists of a coaxial structure immersed in an axial divergent magnetic field, fed with xenon. A plasma is generated by resonant absorption of microwave power (at 2.45 GHz) and is accelerated in an electron driven magnetic nozzle to produce the thrust. Previous measurements, performed with electrostatic probes, have shown promising performances. Electrons are heated at very high temperatures (several tens of eV), and ion kinetic energy is up to 400 eV in the plume. The estimated thrust is 1 mN, with an efficiency of 16In this work, a new version of the device has been conceived for direct thrust measurement on a dedicated thrust balance. The effect of magnetic field topology, propellant, mass flow rate and absorbed power are investigated. Thrust measurement are compared with values estimated from electrostatic probes results (ion current and energy).

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