

Abstract Submitted
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Measurements of neutral and ion velocity distribution functions in a Hall thruster¹ PANAGIOTIS SVARNAS, High Voltage Laboratory, University of Patras, Rion 26500, Greece, IAVN ROMADANOV, University of Saskatchewan, Saskatoon, SK, S7N 5E2, Canada, AHMED DIALLO, YEVGENY RAITSES, Princeton Plasma Physics Laboratory, Princeton, New Jersey 08540, USA — Hall thruster is a plasma device for space propulsion. It utilizes a cross-field discharge to generate a partially ionized weakly collisional plasma with magnetized electrons and non-magnetized ions. The ions are accelerated by the electric field to produce the thrust. There is a relatively large number of studies devoted to characterization of accelerated ions, including measurements of ion velocity distribution function using laser-induced fluorescence diagnostic. Interactions of these accelerated ions with neutral atoms in the thruster and the thruster plume is a subject of on-going studies, which require combined monitoring of ion and neutral velocity distributions. Herein, laser-induced fluorescence technique has been employed to study neutral and single-charged ion velocity distribution functions in a 200 W cylindrical Hall thruster operating with xenon propellant. An optical system is installed in the vacuum chamber enabling spatially resolved axial velocity measurements. The fluorescence signals are well separated from the plasma background emission by modulating the laser beam and using lock-in detectors. Measured velocity distribution functions of neutral atoms and ions at different operating parameters of the thruster are reported and analyzed.

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