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Effect of the Magnetic Field on the Plasma Discharge in a Miniaturized Cylindrical Hall Thruster YEVGENY RAITSES, ARTEM SMIRNOV, NATHANIEL FISCH, Princeton University Plasma Physics Laboratory — Hall thrusters of the conventional annular design become inefficient when scaled to low power. Their lifetime decreases significantly due to the channel wall erosion. Cylindrical geometry Hall thrusters have lower surface-to-volume ratio than conventional annular thrusters and, thus, seem to be more promising for scaling down. A miniaturized cylindrical Hall thruster (50 - 300 W power range) exhibits performance comparable with conventional annular Hall thrusters of the similar size [1,2]. Kinetic modeling of electron dynamics in the thruster channel [3] allows one to optimize the electron confinement over a family of realizable magnetic field and plasma potential distributions. In the present work, the effect of the magnetic filed on the thruster efficiency, as well as on the distributions of the plasma potential, plasma density, and electron temperature is studied experimentally. The results of the experiments suggest the ways for further optimization of the electron transport in the thruster. 1. Y. Raitses and N.J. Fisch, Phys. Plasmas 8, 2579 (2001).

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