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Studies of a Pure Electron Plasma to Investigate Electron Mobility in Hall Thrusters EMILY FOSSUM, LYON KING, Michigan Tech University — Excessive cross-field electron mobility in Hall thrusters has a negative effect on thruster efficiency and has been shown experimentally to be much larger than predicted by classical theory. An electron trapping apparatus was constructed in order to study electron dynamics in the defining electric and magnetic fields of a Hall-effect thruster in a highly controlled environment. Electrons are confined using only electric and magnetic fields without ions and dielectric walls, which are present in a typical Hall thruster. Mobility studies on a non-neutral plasma provide several advantages over a Hall thuster's quasi-neutral plasma, including a well-defined electric field and the ability to take internal electrostatic probe measurements. Cross-field electron mobility was investigated in response to magnetic and electric field strengths and background neutral density. Experimental design considerations including loading mechanisms, trapping potential, field design, and diagnostic techniques are presented along with experimental results. In this investigation, measured cross-field mobility appears to be consistent with Bohm-like mobility rather than classical mobility.

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