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Experimental Evidence of Change in Sheath Properties due to Secondary Electron Emission in a Crossed Field Plasma Setup[1] KAPIL SAWLANI, JOHN FOSTER, University of Michigan, Ann Arbor, MI 48109 — The nature of plasma transport across the magnetic field in crossed-field (CF) devices remains largely an unsolved problem. This can be further complicated by the presence of secondary electrons derived from electron impact on walls. The coupling of these electrons to the bulk plasma and their role in CF plasma transport is also not well understood. The emission of secondary electrons from wall surfaces also affects the sheath potential, thus impacting energy transport to the wall. In this work, a benchtop apparatus is used to elucidate the role that secondary electrons play in regards to CF transport and energy flow to the walls. An electron beam is used to generate a secondary electron plume at the surface of an insulating target. The CF device plasma response to these secondary electrons is assessed by measuring changes to the potential distribution in the sheath of the irradiated target and the measured electron energy distribution function. The variation in the discharge voltage at fixed emission current is also determined which yields insight into CF impedance. The effect of the variation of the electron beam's angle of incidence on the CF current is also characterized. An attempt is made to relate phenomena and trends observed in this work with those in Hall thrusters.

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