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The Effect of Secondary Emission Cathode Parameters on (Near-) Brillouin Flow in Crossed-Field Diodes CHRISTOPHER FICHTL, TIMOTHY FLEMING, KEITH CARTWRIGHT, CHRISTOPHER LENYK, Air Force Research Lab, ICEPIC TEAM — The initial velocity that an electron has from the cathode can change the magnetic field needed to insulate a crossed-field diode[1]. For a secondary emitting cathode the distribution of emitted electron velocities depends on the velocity distribution of electrons returning to the cathode. We have studied the evolution of the Brillouin hub in a crossed-field diode in self-consistent 1d electromagnetic Particle-in-Cell (PIC) code with thermal emission and a secondary emission model by Vaughan[2]. The baseline simulations have thermal emission with 0.1 eV of temperature; this is compared to simulations that have both secondary emission and thermal emission. The fraction of reflected and back scattered primaries is varied to induce perturbations in the Brillouin hub. The temperature of the true secondaries is conveniently set to the thermal emission temperature of 0.1 eV. It is found that relatively few ($\sim$10%) reflected and back scattered primaries allow the Brillouin hub to expand further across the diode as compared to the thermal emission cathode.

[1]A. W. Hull, *Phys. Rev.* 18, 31 (1921)
[2]J. R. M. Vaughan, *IEEE Trans. on Electron Dev.*, Vol. 36, no. 9, 1989.

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