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Electron fluid simulations of 2D electron vortices[1] JUSTIN ANGUS, STEVE RICHARDSON, JOSEPH SCHUMER, STEVE SWANEKAMP, Naval Research Laboratory, PAUL OTTINGER, Engility Corporation — The production of electron vortices in current-carrying plasmas has been observed in recent 2D particle-in-cell (PIC) simulations of the plasma-opening switch. In the presence of a background density gradient in 2D Cartesian systems, vortices will drift in the **B**xGrad(n) direction, where **B** is the magnetic field vector and n is the background plasma density. Vortices are important because of the possible role they play in the penetration of magnetic fields into plasmas. The time scales relevant to electron vortices are typically small enough such that the ions can be considered as infinitely massive and motionless. Here we present results of numerical simulations of 2D, seeded electron vortices in an inhomogeneous background using the cold, collisionless electron fluid equations coupled to the full set of Maxwell's equations. The results of these simulations are compared with results of PIC simulations and the underlying physics of the drift is explored in detail.

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