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Introduction of Shear-Based Transport Mechanisms in Radial-Axial Hybrid Hall Thruster Simulations MICHELLE SCHARFE, NICOLAS GASCON, DAVID SCHARFE, MARK CAPPELLI, Stanford University, EDUARDO FERNANDEZ, Eckerd College — Electron diffusion across magnetic field lines in Hall effect thrusters is experimentally observed to be higher than predicted by classical diffusion theory. Motivated by theoretical work for fusion applications and experimental measurements of Hall thrusters, numerical models for the electron transport are implemented in radial-axial hybrid simulations in order to compute the electron mobility using simulated plasma properties and fitting parameters. These models relate the cross-field transport to the imposed magnetic field distribution through shear suppression of
turbulence-enhanced transport. While azimuthal waves likely enhance cross field mobility, axial shear in the electron fluid may reduce transport due to a reduction in turbulence amplitudes and modification of phase shifts between fluctuating properties. The sensitivity of the simulation results to the fitting parameters is evaluated and an examination is made of the transportability of these parameters to several Hall thruster devices.

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