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Two- and three-dimensional particle-in-cell simulations of ExB discharges JOHAN CARLSSON, IGOR D. KAGANOVICH, ALEXANDER V. KHRABROV, YEVGENY RAITSES, Princeton Plasma Physics Laboratory, ANDREI SMOLYAKOV, University of Saskatchewan — The Large-Scale Plasma (LSP) Particle-In-Cell with Monte-Carlo Collisions (PIC-MCC) code has been used to simulate several crossed-field (ExB) discharges in two and three dimensions. Two-dimensional (2D) simulations of a cold-cathode electric discharge with power-electronics applications and a Penning discharge will be presented. Three-dimensional (3D) simulation results of a cylindrical Hall thruster with scaled plasma parameters will also be shown and compared to experiment [Ellison2012]. To enable the 2D and 3D ExB discharge simulations, several improvements to the LSP code were made, including implementation of a new electrostatic field solver, external-circuit model and models for particle injection and secondary-electron emission. To ensure the correctness of the collision models used (and particularly important for the cold-cathode-discharge simulations), validation and code benchmarking was done with the LSP and EDIPIC codes in 1D for a glow discharge. Results and conclusions will be presented. L. Ellison, Y. Raitses and N. J. Fisch, "Cross-field electron transport induced by a rotating spoke in a cylindrical Hall thruster," Physics of Plasmas **19**, 013503 (2012). Research supported by the U.S. Air Force Office of Scientific Research.

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