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Modeling a Two-Dimensional Plasma Sheath Using a Direct Kinetic Method[1] ASTRID L. RAISANEN, Univ. of Michigan, KENTARO HARA, Stanford Univ., IAIN BOYD, Univ. of Colorado — A sheath forms over surfaces in contact with plasmas to balance the currents of electrons and ions incident from the plasma. In the vicinity of an electrically non-uniform material (e.g. spatially varying conductivity), two-dimensional (2D) kinetic effects may occur in the sheath. A 2D direct kinetic (DK) simulation for charged particle transport is capable of resolving spatial differences that arise in the plasma sheath as a result of these electrically disparate, adjacent materials. An Eulerian method is used to model the evolution of ion and electron transport in a collisionless sheath, describing the behavior of a plasma in two-dimensional (2D2V) discretized phase space. The DK technique is coupled with a solution of Poisson's equation for the electric potential. The model is verified with analytical theory for a quasi-one-dimensional case. A conservative boundary condition for particle injection is implemented at the sheath edge. Spatial differences that arise within the sheath as a result of the electrically disparate, adjacent materials are discussed.

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