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Multidimensional Plasma Sheath Modeling Using The Three Fluid Plasma Model in General Geometries ROBERT LILLY, URI SHUMLAK, University of Washington - Department of Aeronautics and Astronautics, Aerospace Energetics Research Program — There has been renewed interest in the use of plasma actuators for high speed flow control applications. In the plasma actuator, current is driven through the surrounding weakly ionized plasma to impart control moments on the hypersonic vehicle. This expanded general geometry study employs the three-fluid (electrons, ions,neutrals) plasma model as it allows the capture of electron inertial effects, as well as energy and momentum transfer between the charged and neutral species. Previous investigations have typically assumed an electrostatic electric field. This work includes the full electrodynamics in general geometries. Past work utilizing the research code WARPX (Washington Approximate Riemann Problem) employed cartesian grids. In this work, the problem is expanded to general geometries with the euler fluid equations employing Braginskii closure. In addition, WARPX general geometry grids are generated from Cubit or CAD files. Comparisons are made against AFRL magnetized plasma actuator experiments.

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