Abstract Submitted
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Atmospheric Pressure Plasma Jet Modeling with Smoothed Particle Hydrodynamics[1] DECLAN BRICK, GABE XU, University of Alabama in Huntsville — In previous work,[1] a pulsed-dc atmospheric-pressure plasma jet (APPJ) was characterized across varied voltage, pulse width, frequency, and flow rate operating conditions. However, the gas flow structure, along with the spatial temperature and density of the electrons and ions of the APPJ is difficult to measure due to the small sizes. To better understand the relations between the operating conditions, we use we use a multi-step Smoothed Particle Hydrodynamics (SPH) code with Maxwell equation solver called SPFMaX to study the plasma discharge. First, the steady state helium flow structure is studied with a pure fluid simulation. Then, a pulsed power circuit is turned on to ionize the flowing gas, allowing calculations of the plasma characteristics. The simulation is run for a maximum of 200 ms to study the steady state, and 2000 ns to study a single bullet. While the characterization is the primary indented contribution of this model, having a detailed model will allow for predictions of additional operating conditions. Additionally, to the best of our knowledge, this is the first use of SPH to model APPJs. 1. DOI: 10.1109/TPS.2019.2942576

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