Abstract Submitted
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Validation of the Open Source Multi-Fluid Plasma Code: Zapdos[1] COREY DECHANT, North Carolina State University, SHANE KENILEY, University of Illinois - Urbana, BRAYDEN MYERS, KATHARINA STAPELMANN, North Carolina State University, DAVIDE CURRELI, University of Illinois - Urbana, STEVEN SHANNON, North Carolina State University — Validation work was done through comparisons between results obtain from Zapdos and experimental and simulation efforts, this included both low pressure discharges and atmospheric devices (such as the COST plasma jet and GEC reference cell). This effort reveals good agreement between Zapdos and previous efforts in comparing electron density, electron temperature, mean electron energy, metastable densities, and electric potential. The Zapdos application is an open source finite element code for modelling plasmas using the multi-fluid method based in the MOOSE framework. The application includes the continuity equations for electrons, ions, and metastable populations. The mean electron energy was calculated using the energy balance equations. The electric field is determined using the electrostatic approximation and the source terms are determined by the chemistry application CRANE, another MOOSE based application. The modelling of RF CCP discharges at low pressures (around 1 mTorr) and atmospheric devices (such as the COST plasma jet) are compared to previously published experimental data, experimental efforts undertaken at NCSU, and simulation results from other vetted fluid models.

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