Abstract Submitted
for the GEC20 Meeting of
The American Physical Society

Validations for Improvements of the Open Source Plasma Code, Zapdos[1] COREY DECHANT, YUHUA XIAO, CASEY ICENHOUR, North Carolina State University, SHANE KENILEY, University of Illinois - Urbana, ALEXANDER LINDSAY, Idaho National Laboratory, DAVIDE CURRELI, University of Illinois - Urbana, STEVEN SHANNON, North Carolina State University — The Zapdos application is an open source finite element code for modeling plasma using the multi-fluid method based in the MOOSE framework. Comparison work of CCP discharges was performed between Zapdos, previous 1D and 2D modeling efforts, and experimental efforts undertaken at NCSU and elsewhere. The aim of these comparisons was to investigate the current limitations within the fluid code and improve upon them by including additional plasma behaviors as well as improve overall simulation performance. Surface boundaries, species temperatures, and field solutions were investigated during the validation efforts. Studied phenomena included DC self-biasing on the surfaces of RF powered electrodes and gas heating effects on the background gas and ions. To reduce the simulation wall time for the large number of RF cycles needed to reach a periodic steady state, an accelerator based on a modified shooting method was added to Zapdos. For the experimental comparisons, results from the GEC reference cell and the Medusa CCP at NCSU were used for pressures in the Torr range, while results from the COST reference jet were used for atmospheric plasmas.

Corey DeChant
North Carolina State University

Date submitted: 09 Aug 2020   Electronic form version 1.4