Abstract Submitted
for the GEC20 Meeting of
The American Physical Society

Continued Validation Studies using the MOOSE Framework for Plasma Simulation with Electromagnetics[1] CASEY ICENHOUR, COREY DECHANT, North Carolina State University, ALEXANDER LINDSAY, Idaho National Laboratory, DAVID GREEN, Oak Ridge National Laboratory, STEVEN SHANNON, North Carolina State University — Resources and tools for the modeling and simulation of low-temperature plasma (LTP) discharges are increasingly vital to progress in the field in order to properly characterize and study complex source designs and plasma chemistries beyond the scope of traditional diagnostics. Open-source software provides powerful platforms for this work and can enable community-driven LTP R&D. Within the Multiphysics Object-Oriented Simulation Environment (MOOSE) open-source framework [1], capabilities have been demonstrated in the areas of plasma fluids (Zapdos [2]), plasma chemistry (CRANE), and general electromagnetic wave theory (Electromagnetic Library for Kinetics fluids [ELK]). ELK has since been coupled to Zapdos/CRANE to enable fully coupled electromagnetic plasma simulations. This talk will detail the continued validation efforts and discuss Zapdos-ELK-CRANE code coupling with various low-temperature plasma sources. The impact of fully coupled electromagnetics on process parameters (e.g., temperature and electron/ion energy) versus an electrostatic description will also be discussed. [1] Permann et al., SoftwareX 11 (2020) [2] Lindsay et al., J. Phys. D: Appl. Phys. 49 (2016)

[1]INL Graduate Fellowship Program, NSF SI2 Grant 1740300, U.S. Dept. of Energy Office of Science Graduate Student Research Program

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Date submitted: 15 Jun 2020 Electronic form version 1.4