Open source plasma simulation in the MOOSE framework
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— The Multi-Physics Object Oriented Simulation Environment (MOOSE) is an open source framework originally developed for nuclear reactor simulation. Because of its original intention, the framework has a very well established development environment for deploying, tracking, and updating applications and insuring that code is well documented and verified. Recently, MOOSE has grown into a broader range of applications as the need for open source environments in science has grown. In this talk, we will present a brief overview of the MOOSE ecosystem and present results from three recently developed plasma applications: 1.) ZAPDOS, a two-fluid plasma simulation tool, 2.) CRANE, a plasma chemistry application for integration of complex chemical pathways into plasma simulation through ZAPDOS, and 3.) ELK, an electromagnetic solver designed to couple to ZAPDOS and enable solution of a broader class of plasma problems. These results will combine new discoveries and validation efforts, with emphasis on how the MOOSE ecosystem works to advance open source community development of plasma simulation tools.

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