Abstract Submitted
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CRANE: a Novel MOOSE-based Open-Source tool for Plasma Chemistry Applications and Code Coupling[1] SHANE KENILEY, DAVIDE CURRELI, Univ of Illinois - Urbana, COREY DECHANT, STEVEN SHANNON, North Carolina State University — We present CRANE (Chemical ReAction NEtwork), an open-source tool for plasma chemistry applications using the MOOSE finite element framework. The tool facilitates the inclusion of a large number of chemical reactions into a MOOSE application. Adding reactions is simplified using MOOSEs Action system, which automatically adds the necessary reaction rates, source terms, and sink terms based on the reaction equations written in the input file. Results are compared to simulations performed in the plasma chemistry freeware ZDPlasKin. The chemistry tool was also included in the low-temperature atmospheric plasma application, Zapdos, to model plasma chemistry reactions in 1D discharge systems. Zapdos, which was previously utilized to model argon ions and electrons incident on a liquid water interface, has been expanded to allow the inclusion of multiple gas species. Results of Zapdos combined with the plasma chemistry tool are compared to equivalent COMSOL simulations.

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