Abstract Submitted
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Simulation development for multi-ion species shock interaction using discontinuous Galerkin method[1] MEGAN MCCRACKEN, BHUVANA SRINIVASAN, Virginia Tech, MARIA GATU JOHNSON, RICHARD PETRASSO, MIT, MIT/NNSA CENTER OF EXCELLENCE COLLABORATION — The interaction of multi-ion species in plasma shocks is not well understood due to kinetic effects that are necessary to understand the physics of species separation and diffusion. The discontinuous Galerkin method (DGM) can capture sharp gradients, discontinuities, and shocks to effectively study multi-ion-fluid shocks while incorporating some collisional and diffusion physics. The DGM is a high-order shock capturing scheme used extensively for the modeling of hyperbolic equation systems. The gradients at cell interfaces in the DGM are not defined hence recovery methods will be used to accurately and efficiently model diffusion terms using the DGM. This method allows for more accurate capture of species separation in the presence of multiple ion species. Using the newly developed PHORCE (Package for High ORder simulations of Convection-diffusion Equations) code, the physical interactions of multiple ion species within plasma shocks are simulated and compared to kinetic results. PHORCE has been developed at Virginia Tech for multi-dimensional simulations using DGM to solve for high order convection-diffusion equations using unstructured grids for various different equation systems. The numerical algorithm will be described in this work.

[1]MIT/NNSA Center of Excellence

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