Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Continuum Kinetic Studies of the Rayleigh-Taylor instability and nonlocal electron heat conduction.[1] JOHN RODMAN, BHUVANA SRINIVASAN, Virginia Tech — Continuum kinetic simulations offer a method of capturing non-Maxwellian behavior without requiring the tracking of individual particles. In this work, the continuum kinetic code `Gkeyll` is used to study nonlocal plasma transport and its effect on the Rayleigh-Taylor (RT) instability. To study nonlocal electron transport, the Vlasov-Maxwell system is solved to examine changes in heat flow and conductivity related to electron collisionality. When the electron mean-free-path becomes large relative to the temperature gradient scale length, electrons can escape local temperature gradients and deposit their energy elsewhere in the plasma, leading to non-Maxwellian distributions and reduced heat flux around the temperature gradient. Following a 1x3v (1 spatial dimension, 3 velocity space dimensions) study of nonlocal electron transport, plasma transport in the RT instability will be studied kinetically in 2x2v. RT simulations are traditionally performed using fluid models, but kinetic effects on RT growth may be relevant to astrophysical and laboratory high energy-density regimes. Results from this study are compared to other kinetic models.

[1]This work was supported by the National Science Foundation CAREER award under grant number PHY-1847905.

John Rodman
Virginia Tech

Date submitted: 26 Jun 2020 Electronic form version 1.4