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Thermal transport modeling of laser-irradiated spheres[1] K.H. MA, University of Michigan, M.V. PATEL, W.A. FARMER, M. SHERLOCK, Lawrence Livermore National Laboratory, E. JOHNSEN, University of Michigan — In laser-fusion plasmas, classical Spitzer-Harm (SH) local thermal conduction is often used. A flux limiter is employed as an ad hoc fix to reduce the heat flux to more physical levels when the mean-free-paths of the heat flux carrying electrons is comparable to the temperature gradient scale length. This work studies the effect of non-local electron transport in the plasma corona surrounding direct-drive spheres at laser intensities ranging from $10^{14} - 10^{15}$ W/cm^2. In order to highlight the thermal transport modeling, we consider low- to mid-Z materials (Be, Al, Cu), for which non-LTE kinetics are easier and less impactful on observables. One-dimensional spherical radiation-hydrodynamics simulations of the proposed experiments are performed using HYDRA. The thermal transport is modeled using the recently updated Schurtz-Nicolai-Busquet (SNB) reduced-order nonlocal model[1][2]. The HYDRA-SNB model exhibits good agreement with Vlasov-Fokker-Planck modeling, while bot h differ from SH transport, where differences in the thermal heat fluxes lead to hotter coronal electron temperatures.
[1]Brodrick et al., Phys. Plas. 24, 092309 (2017)
[2]Schurtz et al., Phys. Plas. 7, 4238 (2000)

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