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Analytic insights into nonlocal energy flux in laser fusion targets[1]

WALLACE MANHEIMER, DENIS COTOMBANT, Retired from NRL, ANDREW SCHMITT, NRL — There have been several attempts to utilize a Krook model in a laser implosion simulation to study the effects of nonlocal transport of energetic electrons (1-4). Frequently these numerical studies give different and even contradictory results. As these studies use complex radiation hydrodynamics codes, with many processes simultaneously going on, there is little understanding of the various results. The results differ for two reasons, first, differences in the mathematical formulation; and second, differences in the numerical methods. This presents what hopefully will be a much-improved formulation, including a proper model for the Coulomb logarithm where it describes energetic particle collisions in the cool regions of the plasma. It presents analytic insights and simple calculations, which can be used as a check on the numerical results, and discusses various difficulties of implementation.
1. G. Schurtz et al. Phys.Plasmas, 7, 4238, (2000), 2. W. Manheimer et al, Phys. Plasmas, 15, 083103, (2008), 3. A. Marrochino et al, Phys,. Plasmas, 20, 022702, (2013), 4. D. Cao et al, Phys. Plasmas, 22, 082308, (2015). Work supported by US DoE N

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