

Abstract Submitted
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Analytic insights into nonlocal electron thermal transport¹ WALLACE MANHEIMER, DENIS COLOMBANT, Retired from NRL — Several theories of nonlocal electron thermal transport in laser target plasmas, based on a Krook model give rather different results. Sometimes these models show very little effect of fuel preheat on target gain, other calculations show enough preheat that the gain is substantially reduced. We find that there are errors in the theoretical models and very likely errors in some of their numerical implementation. Hence analytic insight is necessary. We derive approximate analytical solutions for the Krook model for nonlocal electron energy transport, ultimately finding a relatively simple formula to estimate for fuel preheat in terms of the laser and target plasma parameters. This analysis can be used as a check on the more complex fluid simulation. In addition to the Krook model being not correctly formulated, another consideration is that a Fokker Planck model gives a rather different solution for the preheat. We also derive a formula for the preheat based on a Fokker Planck model, a formula with is intuitively reasonable and predicts much less preheat than a Krook model. In either model, there can be broadening of the ablation layer which may have an effect on the Rayleigh Taylor instability growth rate.

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