

Abstract Submitted
for the DPP10 Meeting of
The American Physical Society

Advances in Nonlocal Transport Models for Laser Fusion¹ WALLACE MANHEIMER, DENIS COLOMBANT, Naval Research Laboratory, Washington, DC — We have developed a Krook model for nonlocal electron energy transport [1-5]. It gives an analytic solution for the nonthermal electron energy flux, and is relatively simple and inexpensive to incorporate in a fluid simulation. It shows that in some sense, preheat is subtracted from the main electron energy flux, thereby giving rise to flux limitation. In our cited work we have compared our theory with Fokker Planck simulations of simple configurations. The Krook model clearly gives much better agreement than does any other model for electron energy transport. Additional work included a treatment of the center in a spherical plasma, and of the vacuum plasma interface. We find that the Krook model predicts some effects on laser fusion due to preheat and modification of the temporal pressure profile, but the effects at this point do not appear to be major. Further investigations looked into whether a diffusion model for preheat is valid, and we proposed and investigated an improved numerical approach.

[1] W.Manheimer (WM), D.Colombant (DC) and V.Goncharov, Phys. Plasmas (PP), 15, 083103, 2008

[2] DC & WM, PP, 15, 083104, 2008

[3] DC & WM, PP, 16, 0627051, 2009

[4] DC & WM, J. Comp. Phys (2010)

[5] DC & WM, submitted to PP

¹Supported by DoE and ONR.

Wallace Manheimer
Naval Research Laboratory, Washington, DC

Date submitted: 15 Jun 2010

Electronic form version 1.4