

Abstract Submitted
for the DPP11 Meeting of
The American Physical Society

Improved Non-Local Radiation Coupling Model for Mach2-TCRE¹ JOSEPH THORNHILL, JOHN GIULIANI, YOUNG CHONG, Naval Research Laboratory, JOHN APRUZESE, L3 Communications — Mach2-TCRE is a 2D (R-Z) radiation-MHD code with non-LTE population kinetics and radiation transport using ray tracing. The code is designed to simulate the plasma dynamics and equation of state of high temperature K-shell, radiating Z-pinch plasmas. In the past, the radiation coupling that occurs between remote plasma regions was treated within the “on-the-spot-approximation (OTS)”,² i.e., if a photon is absorbed anywhere in the plasma it is assumed to be absorbed in the emitting zone. While this simplifies the energy accounting it does not properly treat the energy transfer between different regions of the pinch. Here we extend the radiation transport capabilities of MACH2-TCRE by following the zone-to-zone radiation coupling using an escape probability method and account for plasma heating by the non-local radiation field. Verification of the new approach is made through 1D comparisons between this method, the OTS approximation, and a full radiation transport calculation.

¹Work supported by DOE/NNSA.

²D. E. Osterbrock, *Astrophysics of Gaseous Nebulae* (Freeman, San Francisco, 1974).

Joseph Thornhill
Naval Research Laboratory

Date submitted: 12 Jul 2011

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