Bobby Philip
Multilevel Preconditioners and Adaptive Mesh Refinement for Non-Equilibrium Radiation Diffusion

T-7
Mathematical Modeling and Analysis
MS B284
P O Box 1663
Los Alamos National Laboratory
Los Alamos
NM 87545
bphilip@lanl.gov

Preliminary results are presented for the solution of non-equilibrium radiation diffusion problems on dynamic, adaptively refined grids. Implicit time integration is used to step over the smallest time-scales in the problem and instead follow the dynamic time scales of interest. BDF2 and Backward Euler time integration schemes are considered. At each time step it is necessary to solve a nonlinear coupled system of equations for radiation energy and material temperature. A preconditioned inexact Newton-Krylov method is used for the nonlinear solves. The physics based preconditioner for the Krylov solver internally uses multilevel solvers based on the Fast Adaptive Composite(FAC) grid method and its variants.