

11a Continuation Algorithms for Space-Time Solutions, with Application to a Reactor Explosion Pde Model

Andrew Salinger

Algorithms and software are being developed to solve for space-time solutions for large-scale problems. By interfacing to application codes that use implicit time stepping routines (e.g. backward Euler), the Jacobian matrix for an entire space-time trajectory is formed and solved. The algorithms allow for parallel partitioning of the problem both across the spatial domain and across time steps.

By formulating the solution trajectory as a steady solution in space-time, all the powerful design and analysis tools developed for steady state problems can be brought to bear on the transient problem. This includes continuation and bifurcation analysis algorithms. The power of this approach will be demonstrated on a PDE model of convection-mitigated explosion in a chemical reactor.