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Adaptive Splitting Methods in Application to a Solid Fuel Ignition Model

Various types of partial differential equations have been playing increasingly important roles in the study of theoretical and numerical combustion. The heat distribution of a premixed, solid-fuel combustor can be decoupled from the activation energy leading to a singular, nonlinear, and degenerate reaction-diffusion equation. A Peaceman-Rachford splitting based adaptive method is developed. Spatial adaptation is accomplished through modified equidistribution principles that stem from a priori solution information. This generates non-uniform exponentially evolving grids. Rigorous numerical analysis are given to ensure the satisfactory effectiveness, efficiency, and numerical stability of the developed scheme. Simulation experiments are provided to illustrate these accomplishments. A brief history is provided, while many open problems are illustrated throughout the discussion.

Friday, January 25, 2013, 1:30 PM
Baylor Sciences Building, Room E.231

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