On the Navier Stokes' Equations for Compressible, Reacting Flow with Large Discontinuous Initial Data

Konstantina Trivisa
University of Maryland (College Park)
trivisa@math.umd.edu

Abstract

The well-posedness, regularity and large time behavior of global discontinuous solutions to the Navier-Stokes equations for a compressible reacting mixture with large discontinuous initial data are established. The model under consideration describes dynamic combustion. Our approach for the existence and regularity is to combine the difference approximation techniques with the energy methods, total variation estimates and weak convergence to deal with the large jump discontinuities and L^∞ initial data. Under certain assumptions, we show that the velocity and the internal energy always decay asymptotically, while the discontinuities of the density, the pressure, and the reactant mass fraction may persist even asymptotically, a phenomenon that is essentially different from that of nonreacting gas flow. We identify conditions on the initial data for the complete burning as $t \to \infty$. These conditions are necessary for certain data.
(*Joint work with G.Q. Chen and D. Hoff.*)