Abstract Submitted
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Thermomechanical phenomena in rapidly heated inert and reactive gases[1] DAVID KASSOY, University of Colorado. Boulder — Asymptotic methodologies are used to identify thermomechanical processes occurring in inert and chemically reactive gases subsequent to deposition of transient, spatially resolved thermal energy into a finite volume ("near-field") of inert or chemically reactive gases. Rational models are developed for a wide range of energy depositions, heating time scales and volume dimensions. When the Mach number of the gas expelled from the heated volume boundary is small, only linear acoustic disturbances can appear in the neighboring, unheated gas ("far-field"). Larger boundary Mach numbers are associated with shock waves in the "far-field." An extreme example describes a spatially resolved heated source for extremely strong blast waves associated with nuclear explosions. The classical model for strong blast waves is reformulated to provide a physically sound explanation of the singularities in the well-known similarity solutions used to describe blast wave evolution. A model for the evolution of a reaction center (hot spot) is considered to identify the characteristic gasdynamics generated by rapid heat addition.

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