On the Riemann problem for a system of balance laws modelling a reactive gas mixture

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Abstract

This paper deals with the Riemann problem for a gas mixture undergoing reversible and irreversible bimolecular reactions governed by a suitable closure at Euler level of the Boltzmann equation, which results to be a set of balance laws. The aim of the paper is to investigate questions like compatibility with entropy principle and dissipative character of the system in order to better understand the effects of the source terms on the structure of the solution of the Riemann problem and its relation with the corresponding solution in absence of chemical reactions, which is here deduced explicitly. Numerical simulations show the space-time evolution of the solution profiles for the proposed reactive system.