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Model of Non-premixed Combustion of Aluminium—Air Mixtures BORIS KHASAINOV, Laboratoire de Combustion et de Détonique, UPR 9028 CNRS, France, ALLEN KUHL, University of California Lawrence Livermore National Laboratory, SERGEY VICTOROV, Moscow Engineering Physics Institute, Russia, PETER NEUWALD, Ernst Mach Institut, Germany, LABORATOIRE DE COMBUSTION ET DE DÉTONIQUE, UPR 9028 CNRS COLLABORATION, UNIVERSITY OF CALIFORNIA LLNL COLLABORATION, MOSCOW ENGINEERING PHYSICS INSTITUTE COLLABORATION, ERNST MACH INSTITUT COLLABORATION — For solving the problem of shock-induced dissemination and burning of aluminium particles in air, we have developed a new solver based on equilibrium equation of states (EOS) of 2-phase reactive mixtures. The solver uses two pre-calculated tables; the larger one describes the equilibrium states of reaction products and the smaller one describes states of fresh air. Being linked with gas-dynamics equations, the solver finds iteratively the mixture pressure and temperature; in addition it furnishes a complete description of chemical and physical transformations. 2D numerical simulations give encouraging agreement with experimental pressure histories recorded on the chamber wall. It is shown that multiple blast wave reflections from the walls of the chamber strongly accelerate particle burning. The results demonstrate the advantages of the equilibrium EOS model and appeal for 3D AMR calculations on massively-parallel computers, which should better define the initial stage of turbulent particle dissemination.

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