NUMERICAL SIMULATION OF HETEROGENEOUS DETONATION USING HLL METHOD FOR BAER–NUNZIATO EQUATIONS

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Abstract: The program is developed and the numerical experiments on the initiation and propagation of the detonation wave in the heterogeneous reactive medium are carried out. The mathematical model is based on the Baer–Nunziato system of equations with the modification of Bdzil *et al.* (1999). The model takes into account the compaction of the solid phase, the exchange of mass, momentum, and energy between the gas and solid phases, including the presence of a local gradient of the volume fraction of the solid phase (so-called nozzle effects). The numerical algorithm is based on the Harten – Lax – van Leer (HLL) scheme. Two regimes of the detonation wave propagation are investigated numerically, namely, the regime with the compaction wave in front of the reaction wave and the regime without the compaction wave. The regimes depend on the intensity of the chemical reactions. The results of the numerical experiments are compared with the simulation results of Schwendeman *et al.* (2008) obtained with the use of Godunov method.

Keywords: heterogeneous detonation; compaction wave; Baer–Nunziato equations; HLL method; numerical simulation

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