A STAGGERED SCHEME USING DISCRETIZATION OF INTERNAL ENERGY EQUATIONS FOR A TWO-PHASE FLOW MODEL

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Abstract. We introduce a new scheme [5] to obtain approximations of solutions of the convective part of the two-phase flow Baer-Nunziato model [2]. We adapt a numerical strategy proposed at first in the monophasic case by Herbin, Latché and Nguyen for the Euler equations [7]; see also [1] for the barotropic Baer-Nunziato model with stiff source terms. This is not the common strategy used for hyperbolic systems: upwinding techniques are performed for each equation separately with respect to the material velocities only and not with respect to the wave structure of the system. A staggered mesh is used for the approximation of the momentum balance equations. Internal energy balance equations are discretized instead of total energy balance equations and a corrective term is added to recover the Rankine-Hugoniot conditions when shock waves are considered. The scheme and its main properties will be described. Numerical results will be provided, confirming that the scheme behaves well. The numerical results [4] include comparisons of errors and CPU cost for a fixed error with others methods: the Rusanov scheme, a relaxation scheme (see [8] or [3] for the isentropic model) and VFROE-ncv [6].

Keywords: Baer-Nunziato model, explicit scheme

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