ID de Contribution: **5** Type: **Non spécifié**

A unified arbitrary-rate mechanical relaxation technique for compressible two-phase flows

mercredi 7 juin 2023 09:00 (1 heure)

Our goal in this talk is to describe an extension of the arbitrary-rate mechanical relaxation techniques proposed by M. Pelanti [2] for compressible two-phase flows with non-barotropic equations of state to a barotropic two-phase flow, and a hybrid barotropic and non-barotropic two-phase flow. As in [2], we could derive the same first-order ordinary differential equation for the difference in the phasic pressure $\Delta p = p_1 - p_2$ of the form

(1) $\partial_t \Delta p = \mu (Z_1 + Z_2) \Delta p$,

but with a different expression of the thermodynamic variable Z_k for k representing the phase of a barotropic flow. It follows that the exact solution of (1) can be used as usual for the solution update in the mechanical relaxation step of the algorithm with the finite-rate relaxation parameter μ over a time step, irrespective of the difference in the equations of state to the two-phase flow. We use the state-of-the-art finite volume method for the numerical solution of the homogeneous part of the model system without the relaxation terms. Sample numerical results will be present to show the feasibility of the algorithm for practical applications. A generalization of the current relaxation technique to a three-phase flow (cf. [1]) will be discussed briefly.

[1] M. Pelanti and K.-M. Shyue, A numerical model for multiphase liquid-vapor-gas flows with interfaces and cavitation. Intl. J. Multiphase Flow, 113:208–230, 2019.

[2] M. Pelanti, Arbitrary-rate relaxation techniques for the numerical modeling of compressible two-phase flow with heat and mass transfer. Intl. J. Multiphase Flow, 153:104097, 2022.

Orateur: SHYUE, Keh-Ming (National Taiwan University)