

Low Velocity Flows



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An all-regime Lagrange-Projection like scheme for 2D homogeneous models for two-phase flows on unstructured meshes

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We propose an all regime Lagrange-Projection like numerical scheme for 2D homogeneous models for two-phase flows. By all regime, we mean that the numerical scheme is able to compute accurate approximate solutions with an under-resolved discretization, i.e. a mesh size and time step much bigger than the Mach number M of the mixture.

The key idea is to decouple acoustic, transport and phase transition phenomenon using a Lagrange-Projection decomposition in order to treat implicitly (fast) acoustic and phase transition phenomenon and explicitly the (slow) transport phenomena. Then, extending a strategy developed in the case of the usual gas dynamics equations, we alter the numerical flux in the acoustic approximation to obtain an uniform truncation error in term of M . This modified scheme is conservative and endowed with good stability properties with respect to the positivity of the density and preserving the mass fraction within the interval $(0,1)$.

Numerical evidences are proposed and show the ability of the scheme to deal with tests where the flow regime may vary from low to high Mach values.

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