

عنوان مقاله:

Improved Multicomponent Multiphase Lattice Boltzmann Model for Physical Foaming Simulation

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خلاصه مقاله:

The lattice Boltzmann models, especially the pseudopotential models, have been developed to investigate multicomponent multiphase fluids in presence of phase change process. However, the interparticle force between different components causes compressibility error in the non-phase-change component. This restricts the model capability in quantitative analysis of the physical foaming process, such as expansion rate and decay time. In the present study, a multicomponent multiphase pseudopotential phase change model (the MMPPCM) is improved by introducing an effective mass form of high-pressure-difference multicomponent model in the non-phase-change component. The improved model is compared with the MMPPCM based on simulations of the phase change process of static and moving fluids, as well as the physical foaming process. Density variation of non-phase-change component and its effect on flow field characteristics are analyzed during the phase change process. Simulation results of physical foaming process lead to about ۱۰% ~ ۲۰% reduction of the compressibility error for the improved model as compared with the results of MMPPCM. The improved model also enhances the computational stability of phase change simulation of the static droplets.

کلمات کلیدی:

Lattice Boltzmann method, Multicomponent, Multiphase, Physical foaming, Compressibility error

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