FM8S_12163

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Modelling Surface Tension Using a Ghost Fluid Technique within a Volume of Fluid Formulation

Marianne M. Francois, Douglas B. Kothe, Sharen J. Cummins

Computer and Computational Scieces Division, Los Alamos National Laboratory, USA

Ghost fluid methods (GFM) are a viable approach for imposing sharp boundary conditions on interfaces that are arbitrarily embedded within the computational mesh. All GFM to date are formulated with an interface distance function that resides within a level-set (LS) framework. Recently we proposed a technique for reconstructing distance functions from volume fractions. This technique enables the exploitation of GFM within a volume of fluid formulation for modeling an interfacial phenomenon like surface tension. Combining GFM with a volume of fluid (VOF) formulation is attractive because of the VOF method's superior mass conservation and because of the ability of GFM to maintain sharp jump conditions. The continuum surface tension force (CSF) method, however, has the propensity to produce smooth jump. In the following, the combined VOF-GFM and more classical VOF-CSF formulations are compared and contrasted. Static and dynamic numerical results are used to illustrate our findings and support our claims.

View the extended summary