An embedded approach for immiscible multi-fluid problems

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ABSTRACT

An embedded formulation for the simulation of immiscible multi-fluid problems is proposed. The method is designed for handling liquid-gas systems, where the gas phase occupies major part of the computational domain. Gas and liquid are modelled using the Eulerian and the Lagrangian formulation, respectively. The Lagrangian domain (liquid) moves on top of the fixed Eulerian mesh. The location of the material interface is exactly defined by the position of the surface mesh of the Lagrangian domain. The individual fluid problems are solved in a partitioned fashion and are coupled using a Dirichlet-Neumann algorithm. The interface Dirichlet boundary conditions representing the effect of the Lagrangian domain' velocity on the fixed Eulerian mesh are applied at the fictitious nodes of the interface Eulerian elements. The formulation exhibits a very good mass conservation. The proposed methodology is validated and its potential application is shown.

REFERENCES

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