6th European Conference on Computational Mechanics (ECCM 6)
7th European Conference on Computational Fluid Dynamics (ECFD 7)
11-15 June 2018, Glasgow, UK

A LEVEL-SET MODEL FOR INTERFACIAL HEAT OR MASS TRANSFER IN TWO-PHASE FLOWS

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Key Words: *Heat and mass transfer, Two-phase flow, Conservative level-set method, Finite-volume method, Unstructured meshes, Adaptive mesh refinement*

A level-set model is proposed for simulating interfacial heat or mass transfer processes in two-phase flows. The Navier-Stokes equations as well as the heat or mass transfer equations, are discretized using a finite-volume approach on a collocated unstructured mesh [1], furthermore a multiple marker level-set methodology [2] is used to avoid the numerical and potentially unphysical coalescence of the bubbles. A one field formulation is adopted for modeling interfacial boundary conditions of the temperature or species concentration at the interface. Some numerical examples are considered to show the capabilities of the model, including pure diffusion with continuous interfacial temperature, as well as discontinuous species concentration at the interface. Simulations of buoyancy-driven motion of single and multiple fluid particles with external mass transfer, and conjugate mass transfer, for Reynolds number $Re \sim O(100)$ and Schmidt number $Sc \sim O(10)$, are also presented, to prove the accuracy and robustness of this model on general unstructured meshes, and also in the framework of dynamically adaptive mesh refinement [3].

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