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LES SIMULATIONS OF TURBULENT TWO-PHASE FLOWS WITHIN A MULTIFIELD APPROACH*

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ABSTRACT Safety issues in nuclear power plant involve complex turbulent bubbly flows. To predict the behavior of these flows, the two-fluid approach is often used. Nevertheless, this model has been developed for the simulation of small spherical bubbles, considered as a dispersed field. To deal with bubbles with a large range of sizes, a multifield approach based on this two-fluid model has been proposed. A special treatment, called the Large Bubble Model, has been implemented and coupled to the dispersed model. A validation is presented in this paper. However, only laminar flows were considered in previous papers. Thus, here, Large Eddy Simulations are investigated to model turbulence effects. For this purpose, the two-fluid model equations are filtered to highlight the specific subgrid terms. Then, an *a priori* LES study using filtered DNS results is detailed. This analysis allows classifying these terms according to their relative weight and then concentrating the modelling efforts on them. Five different turbulence models are then compared. These results are finally used to perform true LES on two different test cases. A feasibility study is first presented on a single-phase flow. Then, the LES models are used to predict flow regimes and are compared to RANS approaches.

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