Abstract Submitted
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A Dual Scale Approach for Modeling Turbulent Liquid/Gas Phase Interfaces[1] MARCUS HERRMANN, DOMINIC KEDELTY, JAMES UGLIETTA, Arizona State University — Advances to a dual-scale modeling approach are presented to describe turbulent phase interface dynamics in a large-eddy-simulation-type spatial filtering context. Spatial filtering of the governing equations introduces several sub-filter terms that require modeling. Instead of developing individual closure-models for the terms associated with the interface, the dual-scale approach uses an exact closure by explicitly filtering a fully resolved realization of the phase interface. This resolved realization is maintained on a high-resolution over-set mesh using a Refined Local Surface Grid approach. The advection equation for the phase interface on this DNS scale requires a model for the fully resolved interface advection velocity. This velocity is the sum of the filter scale LES velocity, available from the LES flow solver, and the sub-filter velocity fluctuation that has two contributions. The first is due to sub-filter turbulent eddies, reconstructed using a local fractal interpolation technique (Scotti Meneveau,1999), and the second is due to sub-filter surface tension forces, reconstructed using a local Taylor analogy approach. Results of the dual-scale model are compared to recent DNS of interfaces in homogeneous isotropic turbulence (Chiodi and Desjardins, 2017).

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