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(Yet Another) Bubble-Induced Turbulence Closure Relation for Multiphase CFD BEN MAGOLAN, EMILIO BAGLIETTO, Massachusetts Inst of Tech-MIT — Modeling generally complex two-phase flows remains a formidable challenge for Eulerian-Eulerian (E-E) multiphase Computational Fluid Dynamics (M-CFD). Of particular interest and modeling difficulty is the effective bubble-induced turbulence (BIT) closure relation, which manifests as additional production and dissipation source terms in typical two-equation turbulence model formulations. The primary challenge is three-pronged and comprises (1) identifying the dominant multiphase turbulence mechanisms, (2) synthesizing them into a model compatible with the E-E framework, and (3) ensuring model extensibility to a broad array of geometries and flow configurations. Here we present a new BIT model that has been developed via analysis of a comprehensive parameter study of bubbly flow Direct Numerical Simulation (DNS) data. This new BIT model is shown to deliver reliable predictions for the DNS data from which it was constructed, demonstrating close agreement with the mean, turbulent, and energy budget profiles. More importantly, the model extends well to other geometries and flow conditions, as evidenced by simulation and presentation of selected flow cases.

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