

# **Cascade Modeling of Single and Two-Phase Turbulence**

by

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The analysis of turbulent two-phase flows requires closure models in order to perform reliable computational multiphase fluid dynamics (CFMD) analyses. A turbulence cascade model, which tracks the evolution of the turbulent kinetic energy between the various eddy sizes, has been developed for the analysis of the single and bubbly two-phase turbulence. Various flows are considered including the decay of isotropic grid-induced turbulence, uniform shear flow and turbulent channel flow. The model has been developed using a “building block” approach by moving from modeling of simpler turbulent flows (i.e., homogeneous, isotropic decay) to more involved turbulent flows (i.e., non-homogeneous channel flow). The spectral cascade-transport model’s performance has been assessed against a number of experimental and direct numerical simulation (DNS) results.