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Characteristics of the mixing volume model with the interactions among spatially distributed particles for Lagrangian simulations of turbulent mixing[1] TOMOAKI WATANABE, KOJI NAGATA, Nagoya University — The mixing volume model (MVM), which is a mixing model for molecular diffusion in Lagrangian simulations of turbulent mixing problems, is proposed based on the interactions among spatially distributed particles in a finite volume. The mixing timescale in the MVM is derived by comparison between the model and the subgrid scale scalar variance equation. A-priori test of the MVM is conducted based on the direct numerical simulations of planar jets. The MVM is shown to predict well the mean effects of the molecular diffusion under various conditions. However, a predicted value of the molecular diffusion term is positively correlated to the exact value in the DNS only when the number of the mixing particles is larger than two. Furthermore, the MVM is tested in the hybrid implicit large-eddy-simulation/Lagrangian-particle-simulation (ILES/LPS). The ILES/LPS with the present mixing model predicts well the decay of the scalar variance in planar jets.

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