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Large eddy simulations and experiments on mixing in a confined rectangular turbulent jet BO KONG, ANUP GOKARN, FRANCINE BATTAGLIA, MICHAEL OLSEN, RODNEY FOX, JAMES HILL, Iowa State University — Large eddy simulations were performed for a confined rectangular coflowing liquid jet at Reynolds number 20,000 based on the average velocity and hydraulic diameter of the channel. An incompressible finite-difference formulation of the filtered Navier-Stokes and mass conservation equations on a partially-staggered grid was used. The effects of grid resolution, numerical schemes, and subgrid models on the LES solutions were studied. Validation was performed by comparing LES statistics with those obtained from low- and high-speed particle image velocimetry and laser-induced fluorescence measurements. These statistics include mean, velocity and scalar variances, Reynolds stress, one- and two-point correlation coefficients, skewness, and kurtosis; all compare well with experimental data. The good agreement with two-point spatial correlations suggests that structures in the LES field are similar to those in the actual flow.

James Hill
Iowa State University

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