Entrainment and mixing in a turbulent transverse jet: a DNS study

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DNS of passive scalar mixing in a round turbulent transverse jet is performed at
conditions matching that of experiment (Su and Mungal, J. Fluid Mech. 2004).
The velocity ratio is 5.7 and the jet Reynolds number is 5000. The simulation is
validated by detailed comparison of mean velocity, turbulence intensities, and scalar
concentration to experiment. The simulation data is used to discuss the turbulent
kinetic energy budget, and different timescales present in the flow, entrainment
characteristics and mechanisms, and possible reasons why RANS computations do
not predict this flow field adequately.

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