Abstract Submitted
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Large-eddy simulations of impinging jets at high Reynolds numbers WEN WU, UGO PIOMELLI[1], Queen's University, Kingston, Ontario, Canada
— We have performed large-eddy simulations of an impinging jet with embedded azimuthal vortices. We used a hybrid approach in which the near-wall layer is modelled using the RANS equations with the Spalart-Allmaras model, while away from the wall Lagrangian-averaged dynamic eddy-viscosity modelled LES is used. This method allowed us to reach Reynolds numbers that would be prohibitively expensive for wall-resolving LES. First, we compared the results of the hybrid calculation with a wall-resolved one at moderate Reynolds number, $Re = 66,000$ (based on jet diameter and velocity). The mean velocity and Reynolds stresses were in good agreement between the simulations, and, in particular, the generation of secondary vorticity at the wall and its liftup were captured well. The simulation cost was reduced by 86%. We then carried out simulations at $Re = 266,000$ and 1.3 million. The effect of Reynolds number on vortex development will be discussed.

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