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Numerical LES study an air-helium buoyant jet in a two vented enclosure

Air-helium buoyant jet rising in a two vented enclosure is studied numerically by large eddy simulations (LES) . The geometrical configuration mimics the experimental setup carried out at CEA Saclay, whose dimensions are chosen to ensure that a laminar/turbulent transition occurs at about the middle height of the cavity. This study focuses on the influence of the boundary conditions on the jet development and the mixing-dispersion phenomenon. We observe that applying equilibrium hydrostatic outlet boundary conditions directly at the vent surfaces underestimates the volumetric flow rate of air entering the enclosure, and thus overestimates the mass inside the cavity. On the contrary, modeling an exterior region in the computational domain better predicts the air flow-rate entrance and the corresponding results match well with the experimental PIV measurements.

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