Poster 1 Aspden & Nikiforakis

Monotone integrated large eddy simulation of open shear flows

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In a buoyant atmospheric plume the latent heat release due to condensation of water vapour provides a secondary source of buoyancy away from the origin of the plume. This disrupts the eddy structure and so Taylor's entrainment hypothesis, based on similarity, is no longer appropriate. Bhat and Narasimha (1996) reproduced the eddy disruption in the laboratory by using electrodes to heat an acidic jet in a deionised ambient. This paper addresses this problem numerically with the aim to increase the understanding of the mechanism by which the jet eddy structure is disrupted and its effect on entrainment. Similar mechanisms exist in related buoyancy-driven flows such as a Rayleigh-Taylor instability. The code used is VARDEN, an incompressible, variable-density Navier-Stokes solver written at the Center for Computational Sciences and Engineering, Lawrence Berkeley National Laboratory, which is capable of performing Monotone Integrated Large Eddy Simulation (MILES). This is a form of LES designed to capture inherently the correct flow of energy through the inertial range and the decay at the grid-scale cut-off. The method does not use an explicit turbulence model and hence makes no assumptions on the structure of the flow, which lends itself to an investigation of the flow in question.