Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Large Eddy Simulation for round jet in cross-flow using Local Mesh Refinement MEHTAP CEVHERI, THORSTEN STOESSER, Cardiff University — The aim of this research is the simulation of near field multi-phase plumes in cross-flows to understand the physical processes of oil spill in Gulf of Mexico. Since this is a multi-phase and multi-scale problem, a local mesh refinement (LMR) technique has been coupled to the multi-grid method to solve the unsteady, incompressible Navier-Stokes problem on a Cartesian grid with staggered variable arrangement. Wall-Adapting Local Eddy Viscosity (WALE) subgrid model has been used to simulate the turbulent flow. In this current study, the verification of the developed code will be presented before the simulation of multi-phase plumes. The accuracy of local mesh refinement and the subgrid model are presented with two test cases: moderate Reynolds number turbulent channel flow and a round turbulent jet into a laminar cross-flow. For the first test case, turbulence statistics for the fully developed turbulent flow are compared with the DNS data. For the second test case, a simulation with a 3.3 velocity ratio and 6930 jet Reynolds number is tested and compared with the experimental and other computational data.

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Date submitted: 01 Aug 2013 Electronic form version 1.4