Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

An Accurate Conservative Level Set/Ghost Fluid Method for the Simulation of Turbulent Primary Atomization HEINZ PITSCH, OLIVIER DESJARDINS, Center for Turbulence Research, Stanford University — The atomization of liquid flows plays an important role in many engineering applications, and yet the numerical simulation of the turbulent break-up process remains an outstanding challenge. The large density ratio between the liquid and the gas, as well as the large range of scales involved in the atomization phenomenon, render this problem especially difficult to tackle numerically. We propose a novel strategy that relies on a conservative level set method to ensure adequate mass conservation and on the ghost fluid method for the accuracy of the sharp interface representation. The method shows good robustness in the presence of interfacial forces, as well as large density ratios. A further accuracy improvement is obtained by coupling an additional distance level set to improve the computation of the interface normals. This approach is validated on a range of test cases with realistic water-air conditions and topology changes. This technique is then used to simulate the turbulent atomization of a round liquid diesel jet. The main features of the liquid jet are described, with particular attention given to the turbulence generation process.

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Date submitted: 03 Aug 2007 Electronic form version 1.4