Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

Numerical simulation of Kelvin-Helmholtz instability and liquid breakup ANGEL BETHANCOURT, KUNIO KUWAHARA, AKIKO MANO, Institute of Computational Fluid Dynamics, MASAHIRO EGAMI, Honda R&D, Co. Ltd — A diffuse interface model is used to model a two-phase flow. It is incorporated into an incompressible Navier-Stokes solver based on a multi-directional finite difference method with third-order upwinding. In order to test the reliability of the code, 2D simulations are performed of a jet into a still fluid. The evolution of the jet is captured with the instability manifesting itself as waves along the surface of the fluids. A simple comparison between the wavelength obtained here and that given by the Kelvin-Helmholtz instability theory shows excellent agreement with the discrepancy been less than 5%. These instabilities grow, and finally break-up into separate chunks, filaments and droplets. This behavior is in qualitative agreement with those reported in the literature. The present results show the accuracy of the present method with consideration of compressibility effects left for future investigation.

Kunio Kuwahara
Institute of Computational Fluid Dynamics

Date submitted: 30 Jul 2008

Electronic form version 1.4