Abstract Submitted
for the DFD06 Meeting of
The American Physical Society

Multiscale simulations of nucleate boiling[1] GRETAR TRYGGVASON, DAMIR JURIC, Worcester Polytechnic Institute — During the last decade, direct numerical simulations of multiphase flow have emerged as a major research tool. The systems examined so far are, however, still very simple compared to those systems routinely encountered in engineering applications and numerical simulations of more complex flows, such as boiling, are emerging as the next frontier in numerical studies of multiphase flows. Here we describe a method that has been developed to study the nucleate boiling from many interacting nucleation sites in forced convection boiling. The method is based on the "one-fluid" formulation of the governing equations which are solved on a fixed grid and where the phase boundary is explicitly represented by connected marker points. The method has already been used to examine film boiling, but the challenge here is the accurate representation of the nucleation sites and the small-scale motion near the wall. To capture the evaporation of the microlayer left behind as the base of the bubble expands we use a semi-analytical model that is solved concurrently with the rest of the simulations. Preliminary results for the forced convective nucleate boiling in a channel are shown.

[1]Research supported by NASA.

Gretar Tryggvason
Worcester Polytechnic Institute

Date submitted: 27 Jul 2006 Electronic form version 1.4