Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Two-Phase Lattice Boltzmann Modeling of Boiling Phenomena
MAHMOOD MOHAMMADI SHAD, TAEHUN LEE, MASAHIRO KAWAJI, Mechanical Engineering Department, City College of City University of New York —
Modern advanced technologies such as electronics cooling need large heat removal from surfaces. Nucleate boiling phenomena provides sufficient cooling for these purposes because of large value of latent heat stored in the liquid. A modified multiphase lattice Boltzmann equation model is developed for liquid-vapor phase change phenomena. The volumetric mass flow rate at the interface due to phase change is included in the non-zero value of divergence of velocity. The evolution equation for hydrodynamic pressure is used to force the incompressibility in the bulk regions and the compressibility in the interfacial region. The one-dimensional Stefan problem with analytical solution is used to validate the proposed model and the two-dimensional nucleate boiling on a flat surface is simulated as the main case study.

Mahmood Mohammadi Shad
Mechanical Engineering Department,
City College of City University of New York

Date submitted: 02 Aug 2013 Electronic form version 1.4