Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Modeling of wall-induced force for wall-bounded bubbly flow[1]
DONGJOO KIM, Kumoh National Institute of Technology, JUNGWOO KIM, Seoul National University of Science and Technology, HYUNGMIN PARK, JUN HO LEE, Seoul National University — The two-fluid model based on Eulerian-Eulerian approach has been widely used for simulating two-phase flow in industrial applications due to much less CPU time compared with interface tracking methods. However, the two-fluid approach requires accurate modeling of mass and momentum transfers between phases. The interfacial momentum exchange terms include drag, shear-induced lift, and wall-induced force. The last one is particularly important in order to correctly predict "wall peaking" and "core peaking" phenomena observed in bubbly pipe flows. However, the wall-induced force is not fully understood yet and the wall force coefficient used in previous studies has a wide range of values, probably tuned to match experiment. Therefore, we propose a new wall-induced force model in the present study. To verify the accuracy of present model, numerical simulations are performed for several laminar bubbly flows available in the literature. The spatial distributions of void fraction, liquid velocity, and bubble velocity are compared with those with previous models as well as experimental results.

[1]Supported by the NRF programs (NRF-2012M2A8A4055647) of Korean government.

Dongjoo Kim
Kumoh National Institute of Technology

Date submitted: 01 Aug 2014 Electronic form version 1.4