Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

ANFIS modeling for prediction of particle motions in fluid flows
ARMAN SAFDARI, KYUNG CHUN KIM, Pusan Natl Univ — Accurate dynamic analysis of parcel of solid particles driven in fluid flow system is of interest for many natural and industrial applications such as sedimentation process, study of cloud particles in atmosphere, etc. In this paper, numerical modeling of solid particles in incompressible flow using Eulerian-Lagrangian approach is carried out to investigate the dynamic behavior of particles in different flow conditions; channel and cavity flow. Although modern computers have been well developed, the high computational time and costs for this kind of problems are still demanded. The Lattice Boltzmann Method (LBM) is used to simulate fluid flows and combined with the Lagrangian approach to predict the motion of particles in the range of masses. Some particles are selected, and subjected to Adaptive-network-based fuzzy inference system (ANFIS) to predict the trajectory of moving solid particles. Using a hybrid learning procedure from computational particle movement, the ANFIS can construct an input-output mapping based on fuzzy if-then rules and stipulated computational fluid dynamics prediction pairs. The obtained results from ANFIS algorithm is validated and compared with the set of benchmark data provided based on point-like approach coupled with the LBM method.

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Date submitted: 21 Jul 2015 Electronic form version 1.4