Abstract Submitted
for the DFD07 Meeting of
The American Physical Society

Modeling of Bio-Fluids Flow with Complex Geometry Using Immersed Boundary Method SHAOLIN MAO, ISMAIL CELIK, West Virginia University — Fluid dynamics problems in the area of bio-fluids involve complex geometries and moving boundaries in addition to strong transients. The applications of CFD to such problems traditionally employ boundary fitted coordinates, which require generation of complicated computational grids. The alternative approach utilizing Cartesian coordinates with embedded virtual force method (immersed boundary method) avoids the problem of expensive and time consuming boundary fitted grid. The simple orthogonal grids directly benefit numerical accuracy and computational efficiency. An immediate application of immersed boundary method (IB) is to modify in-house CFD DREAM code for bio-engineering applications using domain decomposition methodology. Several benchmarks are tested and numerical results for gas-droplet two-phase flow are shown to examine the transport and dispersion of germ-laden droplets in a room. This modeling effort provides valuable information for ventilation control strategies to improve airflow patterns to reduce indoor airborne infection risk.

Shaolin Mao
West Virginia University

Date submitted: 06 Aug 2007 Electronic form version 1.4