1089-76-66 **Huidan Whitney Yu*** (whyu@iupui.edu). *Mass-conserved volumetric lattice Boltzmann method for biological flows with or without willfully moving boundaries.*

We develop a mass-conserved lattice Boltzmann formulation for willfully moving arbitrary boundaries using volumetric representation aiming to simulate biological flows in human body. In this method, fluid particles are uniformly distributed in lattice cells characterized by the ratio of solid volume over the cell volume to distinguish three types of lattice cells in the flow domain: solid,fluid,and boundary cell. The formulation of consists of three parts: (1) collision taking into account of momentum exchange between the willfully moving boundary and the flow; (2) Streaming accompanying with a volumetric bounce-back procedure at boundary cells; and (3) Boundary-induced fluid migration to satisfy mass conservation of fluid when the boundary crosses over a boundary cell and becomes solid cell. This approach can handle arbitrary boundary orientation and motion with respect to the mesh. Two application studies are carried out for validation. One is blood flow in aorta and another is urine flow in urinary tract driven by peristaltic motion of ureter. The focus is on the examination of the wall shear/normal stress on artery's inner layer aiming to help predict the development and evolution of aortic aneurysms and dissections in the former and prostate problems in the latter. (Received January 28, 2013)