

Abstract Submitted
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Volumetric Lattice Boltzmann Simulation for Fluid dynamics and Turbulence in Practical Syringes EVERTON LIMA, Department of Computer and Information Science, Department of Mathematical Sciences, Indiana University-Purdue University Indianapolis (IUPUI), DEBANJAN DEEP, HUIDAN (WHITNEY) YU, Department of Mechanical Engineering, Indiana University Purdue University Indianapolis (IUPUI) — We conduct numerical experiments to study fluid dynamics and turbulence in syringes using volumetric lattice Boltzmann method (VLBM) that is developed for dealing with arbitrary moving boundaries. Several common used medical syringes are used to predict the efficiency and safety of syringes experiencing low flow infusion rates. It is found that smaller size syringes reach a steady flow rate much sooner than larger ones, which are in quantitative agreement with experimental results. The relation between the syringe size and its steady flow rate is revealed. At low flow rates, corner vortices are observed. We explore conditions that lead to turbulent flow aiming to aid safer syringe application in nursing practices.

Huidan (Whitney) Yu
Indiana University-Purdue University Indianapolis (IUPUI)

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