1155-76-327 **Wei Zhang*** (wz7ap@virginia.edu), Department or Mechanical and Aerospace Engine, University of Virginia, Charlottesville, VA 22904, **Junshi Wang** (jw9un@virginia.edu), Department or Mechanical and Aerospace Engine, University of Virginia, Charlottesville, VA 22904, and **Haibo Dong** (hd6q@virginia.edu), Department or Mechanical and Aerospace Engine, University of Virginia, Charlottesville, VA 22904. *Application of sharp-interface immersed boundary method with block-based adaptive mesh refinement on a bio-inspired flow.*

Simulations on the bio-inspired flows with moderate Reynolds numbers, complex geometry require dense and/or large scale mesh, which is a challenge for the current numerical methods. Based on the 3D sharp interface immersed boundary method with multigrid acceleration (Mittal, et al. JCP 2008), an improved method is developed in the current work, with a block-wise Adaptive Mesh Refinement (AMR), an MPI/OpenMP hybrid parallelization method compatible to the AMR, and a Level-set boundary reconstruction. With the block-wise AMR, a moving-block technique is developed to make it possible to numerically study a body moving in a big domain; and a multi-block technique is developed to simulate multiple bodies in a schooling distribution. The current method provides a highly efficient and extensible way to simulate the bio-inspired problems with dense mesh in a big domain. The newly developed is used to study the airflows and the resultant aerodynamic pressure or force in the pharyngeal airway to understanding the pathophysiology of snoring and sleep apnea. The flow is analyzed for the pressure fluctuations in the pharyngeal airway and found the vortex formation, aerodynamic pressure, and pharyngeal wall force was significantly affected by the width of the pharyngeal airway. (Received January 18, 2020)