

Abstract Submitted  
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**Simulation of flow over a sphere in a boundary layer using a GPU accelerated IB-LBM**<sup>1</sup> WONHO BAE, JUNG-IL CHOI, Dept. CSE, Yonsei University — Numerical simulations of flow over a sphere embedded in a laminar boundary layer are conducted for characterizing the effects of wall proximity on the drag and lift forces acting on the sphere. The wall proximity is defined as the distance from the wall to the center of sphere. We utilize an immersed boundary-lattice Boltzmann method (IB-LBM) with a multi-direct forcing technique (Suzuki & Inamuro, *Computers & Fluids* 2011) and combine the present method with a multi-block method (Yu et al., *IJNMF* 2002) for refining lattices near the sphere. We implement the present IB-LBM into a Graphical Processing Unit (GPU) using a PGI CUDA Fortran programming environment for accelerating the computations. We perform benchmark tests based on simulations of flow over a sphere in a free-stream for validations of the present IB-LBM and evaluations of the performance of the GPU implementation. The results of the drag and lift forces on the sphere according to the wall proximity will be shown in the final presentation.

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