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An immersed boundary method for imposing solid wall conditions in lattice Boltzmann solvers for single- and multi-component fluid flows ZHE LI, JULIEN FAVIER, UMBERTO D'ORTONA, Laboratoire M2P2, UMR 7340 CNRS/Aix-Marseille Université, SÉBASTIEN PONCET, Département de génie mécanique, Faculté de génie, Université de Sherbrooke, — In this work, one proposes an immersed boundary-lattice Boltzmann coupled algorithm to solve single- and multi-component fluid flows, in the presence of fixed or moving solid boundaries. The prescribed motion of immersed boundaries is imposed by adding a body force term in the lattice Boltzmann model, which is obtained from the macroscopic fluid velocity definition interpolated at the Lagrangian solid points. Numerical validation test cases show that the proposed numerical solver is second-order accurate. Furthermore, the Shan-Chen's lattice Boltzmann model is applied for multi-component fluid flows, and a special focus is given to the treatment of different wetting properties of fixed walls. The capability of the new numerical solver is finally evaluated by simulating a cluster of moving cilia in a two-component fluid flow.

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