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Resolution analysis of particle transport dynamics for the Lattice-Boltzmann Method COSIMO LIVI, GIANLUCA DI STASO, HERMAN J.H. CLERCX, FEDERICO TOSCHI, Eindhoven University of Technology — The capability to simulate a two-way coupled interaction between an arbitrary-shape colloidal particle and a fluid is important for a range of practical applications, however the computational cost can become burdensome. We propose a systematic error analysis of finite-size particle dynamics using the Hermite regularized Lattice Boltzmann method, for different particles resolution, addressing translational and rotational systems separately. The motivation is the understanding of the degree of accuracy provided by different boundary condition models at the fluid-solid interface, with a focus on cases where particles are discretized using few lattice grid points. We show that through a second-order accurate interpolated bounce-back scheme a strong error suppression can be achieved with respect to the standard first-order accurate approach, allowing to simulate smaller particles and thus improving computational performances. An improved version of the former interpolation scheme is developed in order to compute particle boundary position also when the particle is crossing a link between two fluid nodes, showing that the capability to resolve non-spherical particles is further enhanced.

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