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Multi-particle suspension in a laminar flow agitated by a Rushton turbine

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Highlights:

- The motion of multiple particles was measured by using two high-speed cameras.
- Reproducible trajectories and velocities of the particles were obtained.
- Simulated trajectories and velocities of particles agree with experimental results.

ABSTRACT

Multi-particle suspension in a laminar stirred tank flow agitated by a standard Rushton turbine was investigated experimentally and numerically. In the experiments, the motion of the particles was measured by two high-speed cameras and was quantitatively analyzed. Two very stable particle patterns were observed. Strong flow is required to break these patterns because their formation hinders the particle lift-off process. The experimental trajectories and vertical velocities of the particles were measured, and highly reproducible results were found. Direct numerical simulations based on the lattice-Boltzmann method and the resolved particle model were performed to fully resolve the motion of the particles and the flow field. The influence of the friction coefficient and the subgrid lubrication

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