Abstract Submitted
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Interactions of non-spherical particles in simple flows[1] MEHDI NIAZI, LUCA BRANDT, Linne FLOW Centre, KTH Mechanics, Stockholm, Sweden, PEDRO COSTA, WIM-PAUL BREUGEM, Lab. for Aero and Hydrodynamics, TU-Delft, Delft — The behavior of particles in a flow affects the global transport and rheological properties of the mixture. In recent years much effort has been therefore devoted to the development of an efficient method for the direct numerical simulation (DNS) of the motion of spherical rigid particles immersed in an incompressible fluid. However, the literature on non-spherical particle suspensions is quite scarce despite the fact that these are more frequent. We develop a numerical algorithm to simulate finite-size spheroid particles in shear flows to gain new understanding of the flow of particle suspensions. In particular, we wish to understand the role of inertia and its effect on the flow behavior. For this purpose, DNS simulations with a direct-forcing immersed boundary method are used, with collision and lubrication models for particle-particle and particle-wall interactions. We will discuss pair interactions, relative motion and rotation, of two sedimenting spheroids and show that the interaction time increases significantly for non-spherical particles. More interestingly, we show that the particles are attracted to each other from larger lateral displacements. This has important implications for collision kernels.

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