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Particle drifts in semi-dilute suspensions of highly viscous droplets HUGUES BODIGUEL, FLORINDA SCHEMBRI, VINCENT MANSARD, ANNIE COLIN, Univ. Bordeaux — Though already the focus of many experimental and theoretical work, the origin and features of particle migration of semi-dilute suspensions is still in debate. Shear induced cross-stream migration is emphasized in microfluidic flows where high gradients of shear rate are obtained. We study suspensions made of highly viscous droplets in an index matched liquid as a model system. Particle deformation could be neglected, similarly to contact forces that are thought to play a role in suspensions of solid particles. In this work, we focus on a feature of particle migration which has been scarcely described, the particle drift in the flow direction. For that purpose, we developed a technique based on fluorescence photobleaching which enables us to measure simultaneously the particle and suspending fluid velocities. Particles are immersed in a solution containing fluorescein. Thanks to confocal microscopy, we follow the displacement of a bleached line together with the displacement of the particles. The results show that the particle velocity is generally lower than that of the suspending fluid, in a wide range of concentrations from 5 to 40%. Besides, we also observe a cross-stream migration that is quantified thanks to a balance with buoyancy and compared to existing theories.

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