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Simulations of the dynamics of soft particles of different shapes suspended in liquids under shear flow. MASSIMILIANO MARIA VILLONE, Center for Advanced Biomaterials for Health Care @CRIB, Istituto Italiano di Tecnologia, GAETANO D'AVINO, Dipartimento di Ingegneria Chimica, dei Materiali e della Produzione Industriale, Università di Napoli Federico II, MARTIEN A HULSEN, Department of Mechanical Engineering, Eindhoven University of Technology, PIER LUCA MAFFETTONE, Dipartimento di Ingegneria Chimica, dei Materiali e della Produzione Industriale, Università di Napoli Federico II — Soft particles of different shapes are found in several natural and industrial systems, examples including biological cells, elastic capsules, and microgels. When suspended in a flowing liquid, such deformable particles can exhibit complicated dynamics in response to the hydrodynamic forces exerted by the suspending fluid and, in turn, have a significant impact on the overall mechanical properties of the multiphase material. The behavior of suspensions of soft particles, both of spherical and non-spherical shape at rest, in Newtonian and viscoelastic fluids subjected to shear flow is studied through direct numerical simulations. In both Newtonian and viscoelastic matrices, initially spherical particles are found to deform and eventually migrate orthogonally to the flow, the direction and velocity of such migration being determined by the interplay of the geometrical and the rheological parameters of the system. Non-spherical particles have even more complex dynamics due to their non-trivial undeformed shape, which introduces additional parameters to the system.

Massimiliano Maria Villone
Center for Advanced Biomaterials for Health Care @Crib,
Istituto Italiano di Tecnologia

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