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Effects of inertia and viscoelasticity on the orientation dynamics of axisymmetric particles VIVEKANAND DABADE, GANESH SUBRAMANIAN, EMU, JNCASR, Bangalore-560064,Karnataka — The talk will focus on the analytical investigation of the effects of weak inertia and fluid viscoelasticity on the orientation dynamics of a spheroidal particle in two canonical flow situations: 1. A spheroid sedimenting in a quiescent fluid, and 2. A neutrally buoyant spheroid rotating in a simple shear flow. The spheroidal geometry is taken as representative of the general effects of particle anisotropy in disperse multiphase systems. The orientation distribution of a non-Brownian spheroidal particle remains indeterminate in both sedimentation and shear flow in the Stokes limit. Either of inertia or viscoelasticity remove this indeterminacy. The above problems are analyzed using a novel approach based on the formalism of vectorial spheroidal harmonics together with the generalized reciprocal theorem. We obtain closed-form expressions for the *O(Re)* inertial and *O(De)* viscoelastic torques in sedimentation, and the *O(Re)* angular velocity in simple shear flow, valid for an arbitrary aspect ratio. The present results highlight errors in earlier theoretical and numerical calculations.

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