# Motion of a neutrally buoyant ellipsoid in viscous shear flow

Jorge Peixinho[1] & Jean-Régis Angilella[2]

[1] Laboratoire Ondes et Milieux Complexes, CNRS et Normandie Université, 76600 Le Havre
[2] Université de Caen Normandie, ESIX, 50130 Cherbourg
jorge.peixinho@univ-lehavre.fr

We describe experiments on the orientation dynamics of a single spheroid in the linear viscous shear flow between two concentric cylinders. The inner cylinder is rotating, the outer one is held fixed and the gap is filled with a highly viscous liquid. A neutrally buoyant prolate (elongated) particle is placed in the gap and its length is equal to the gap-width between the cylinders. Its initial position and orientation can be varied. In the absence of wall and inertia, Jeffery [1] showed that axisymmetric particles, including ellipsoidal particles, experience periodic motion. Clearly, the confinement is dominant here [2] so that motion in the shear plane is limited. The period of tumbling is systematically higher than Jeffery's prediction, although it also decreases with the shear rate. The particle velocity is sensitive to the initial radial position of the particle and to the distance to the wall. Moreover, the intrinsic motion of the particle, that is its rotation around its axis, is in agreement with the wall-free theory that indicates a rotation rate half the shear rate of the flow.

## Références

1. G. B. Jeffery, *Proc. R. Soc. Lond. A*, **1922**, 161-179 (1922).
2. T. Rosén, J. Einarsson, A. Nordmark, C. K. Aidun, F. Lundell & B. Mehlig, *Phys. Rev. E*, **92**, 63022 (2015).