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**Jeffery orbits in shear-thinning fluids** ARMAN ABTAHI, GWYNN ELFRING, University of British Columbia — At zero Reynolds number, spheroids and long slender bodies in shear flow undergo a periodic motion. In the absence of inertial and Brownian forces, the motion of a neutrally buoyant ellipsoid of revolution in a simple uniform shear was solved by Jeffery who found that the particles axis of revolution rotates on infinitely many degenerate periodic orbits called "Jeffery orbits". Since this classical work, a number of various studies have demonstrated that inertia (both of the particle and the fluid) and viscoelasticity tend to have a dramatic effect on the particle dynamics, but the effects of shear-dependent viscosity has not previously been explored. In this talk we consider the dynamics of a neutrally-buoyant prolate spheroid in a shear flow of a shear-thinning fluid. We model the fluid using a Carreau model and to capture the leading-order effects of shear-thinning rheology on the dynamics we use a perturbation expansion in the weakly shear-thinning regime and use the reciprocal theorem to compute the dynamics. We find that the symmetry of the Jeffery orbits in Newtonian fluids is maintained when the fluid displays shear-thinning, however the changes in viscosity tend to increase the time the particle spends aligned with the flow.

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