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Motion of a spheroidal capsule in a simple shear flow JOHANN WALTER, ANNE-VIRGINIE SALSAC, DOMINIQUE BARTHÈS-BIESEL, CNRS - Univ. de Technologie de Compiègne — A capsule is a liquid droplet enclosed in a thin hyperelastic membrane. Microcapsules have various biomedical applications and can be studied as models for circulating cells, especially red blood cells. While many numerical studies have focussed on initially-spherical capsules, the aim of this work is to model the behavior of an ellipsoidal capsule in a simple shear flow. The capsule wall is modeled using finite membrane elements, while the fluids are treated using the boundary integral formulation of the Stokes equations. The viscosity ratio between the inner and outer fluids is kept at 1. When the membrane stiffness is large compared to the flow strength, the capsule undergoes a"tumbling" motion. As the flow rate is increased, a transition occurs toward a "swinging" motion. In this study, we show the influence of the ellipticity of the capsule and of the law modeling the membrane on the behavior of the capsule. Aspect ratios ranging from $1:4$ (oblate) to $4:1$ (prolate) are considered, and two membrane laws (the neo-Hookean law and Skalak's) are compared.

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