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Effect of bending on the dynamics and wrinkle formation for a capsule in shear flow ANNE-VIRGINIE SALSAC, Univ Technol Compiegne, CLAIRE DUPONT, Univ Technol Compiegne and Ecole Polytechnique, DOMINIQUE BARTHES-BIESEL, Univ Technol Compiegne, MARINA VIDRASCU, UPMC, PATRICK LE TALLEC, Ecole Polytechnique — When microcapsules are subjected to an external flow, the droplets enclosed within a thin hyperelastic wall undergo large deformations, which often lead to buckling of the thin capsule wall. The objective is to study numerically an initially spherical capsule in shear flow and analyze the influence of the membrane bending rigidity on the capsule dynamics and wrinkle formation. The 3D fluid-structure interactions are modeled coupling a boundary integral method to solve for the internal and external Stokes flows with a thin shell finite element method to solve for the wall deformation. Hyperelastic constitutive laws are implemented to model the deformation of the capsule midsurface and the generalized Hooke's law for the bending effects. We show that the capsule global motion and deformation are mainly governed by in-plane membrane tensions and are marginally influenced by the bending stiffness Ks. The bending stiffness, however, plays a role locally in regions of compressive tensions. The wrinkle wavelength depends on Ks following a power law, which provides an experimental technique to determine the value of Ks through inverse analysis.

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