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Hydrodynamic Interaction Between Two Bioartifical Capsules in Shear Flow

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The hydrodynamic interaction between two liquid filled identical spherical capsules is studied in simple shear flow. The centres of mass of the capsules are initially located in the shear plane, where they remain during motion. The membrane is hyperlelastic, infinitely thin and devoid of bending resistance. The boundary element method is used with bi-cubic B-splines as basis functions to map each capsule surfaces on a structured mesh. This guarantees continuity of second order geometrical properties with respect to the position of the Lagrangian particles used for tracking the location of the interface at each time step. When interacting, the capsules undergo large deformation. In the wake, an oscillation in the elastic tensions may lead to local buckling of the membrane and eventual damage. A trajectory shift that increases the cross streamline separation is predicted. It depends in a complicated fashion on initial particle separation, membrane properties and flow strength.

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