Shape evolution of fluid deformable surfaces under active geometric forces

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Abstract

We consider models for fluid deformable surfaces as a general modelling concept for biological surfaces and extend the approach by considering active terms that depend only on the (extrinsic) curvature of the surface. We discuss an evolving surface finite element scheme to discretize the arising equations without additional assumptions like axisymmetry, and show corresponding simulations. Due to the additional forces, the well known minimizers of the Helfrich energy can become unstable and new steady states arise. The simulated shape evolutions demonstrate a wide interplay of dissipation, bending and active torques which leads to phenomena like chirality and symmetry breaking.

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