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Cylindrical shapes of Helfrich spontaneous-curvature model. (English) Zbl 1326.74081

J. Geom. Symmetry Phys. 36, 99-115 (2014).

Summary: The governing equation of the Helfrich spontaneous-curvature model is the Helfrich equation. It is a coordinate free equation that describes the equilibrium shapes of biological (fluid) membranes. We make use of the conformal metric representation of the Helfrich equation and by applying the symmetry group reduction method we obtain a translationally invariant solution.

Based on that solution, we derive analytic expressions for the position vector of special cylindrical equilibrium shapes. Plots of the graphs of some closed directrices of these shapes are presented.

MSC:

74K15 Membranes

74L15 Biomechanical solid mechanics

92C10 Biomechanics