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Sören Bartels* (bartels@ins.uni-bonn.de), Institute for Numerical Simulation, University of Bonn, 53115 Bonn, Germany. *Modeling and Simulation of Director Fields on Flexible Surfaces.*

We discuss the numerical minimization of an energy functional that couples the curvature of a surface with a director field defined on the surface. The functional is a combination of a Frank energy and a Willmore functional including a spontaneous curvature that is proportional to the surface divergence of the director field. Defects in the director field thus induce strong local curvature. Such functionals occur in the mathematical modeling of surfactants and may serve as simple descriptions for the interplay of shapes and orientations of lipid molecules of biomembranes. For surfaces that can be described by graphs, we propose and analyze a combined mixed finite element and projection scheme. Numerical experiments are presented and generalizations to closed surfaces are discussed. This is joint work with Georg Dolzmann (U Regensburg, Germany) and Ricardo H. Nochetto (U Maryland, USA). (Received March 27, 2010)