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Albert-Ludwigs-Universität Freiburg, Hermann-Herder-Str. 10, 79104 Freiburg, Germany, and  
**Stephan Wojtowytsch.** *A phase field model for Willmore's energy with topological constraint.*

We consider the problem of minimizing Willmore's energy on confined and connected surfaces with prescribed surface area. To this end, we approximate the surface by a level set function  $u$  admitting the value  $+1$  on the inside of the surface and  $-1$  on its outside. The confinement of the surface is now simply given by the domain of definition of  $u$ . A diffuse interface approximation for the area functional, as well as for Willmore's energy are well known. We address the main difficulty, namely the topological constraint of connectedness by a penalization of a geodesic distance which is chosen to be sensitive to connected components of the phase field level sets and provide a proof of Gamma-convergence of our model to the sharp interface limit in case of a two-dimensional ambient space. Furthermore, we show some numerical results. This is joint work with Stephan Wojtowytsch (Durham) and Antoine Lemenant (Paris 7). (Received September 22, 2015)