1060-35-191 **Patrick W. Dondl*** (pwd@hcm.uni-bonn.de), Hausdorff Center for Mathematics, University of Bonn, Endenicher Allee 60, 53119 Bonn, Germany, and **Luca Mugnai** and **Matthias Roeger**. *A phase field model for elastic confined structures.*

We consider the problem of minimizing Euler's elastica energy for simple closed curves confined to the unit disk. To this end, we propose a phase field approximation making use of the fact that one can approximate a simple closed curve by the zero level set of a smooth field with values $+1$ on the inside and -1 on the outside of the curve. The outer container now becomes just the domain of the phase field. The approximation of the elastica energy by an interfacial energy functional of the form $\frac{1}{c_0}\int_{B_1(0)}\frac{1}{\varepsilon}\left(-\varepsilon\Delta u+\frac{1}{\varepsilon}W(u)\right)^2$ is well known, the length of the curve can be evaluated using a Modica-Mortola functional. Implementing the topological constraint thus becomes the main difficulty here. We propose a solution based on a diffuse approximation of the winding number, present a proof that one can approximate a given sharp interface using a sequence of phase fields, and show some numerical results using finite elements based on subdivision surfaces. (Received March 30, 2010)