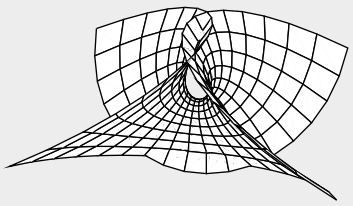

Einladung zum Oberseminar Mathematik in den Naturwissenschaften

Julius-Maximilians-Universität Würzburg
Lehrstuhl für Mathematik in den Naturwissenschaften

Giuseppe Tomassetti

Università degli Studi Roma Tre

Shape programming of a magnetic elastica

Motivated by recent developments in microrobotics, we consider a cantilever beam which possesses a possibly non-uniform permanent magnetization, $\alpha(s)$, and whose shape $\vartheta(s)$ is controlled by an applied magnetic field, $\vec{h}$. We model the beam as a plane elastic curve and we suppose that the magnetic field acts upon the beam by means of a distributed couple that pulls the magnetization towards its direction. Given a list $(\overline{\vartheta}_i(s))$, $i = 1, \dots, n$ of n *target shapes*, we look for a design of the *magnetization profile* $\alpha(s)$ and for a list $(\overline{\vartheta}_i(s)), i = 1, \dots, n$ of *controls* such that the *deformed shapes* $(\vartheta_i(s))$, $i = 1, \dots, n$ assumed by the beam when acted upon by the controls are *as close as possible to the targets*, in an averaged sense. To this effect, we formulate and solve an optimal design and control problem leading to the minimization of a functional which we study by both direct and indirect methods. In particular, we prove uniqueness of minimizers for sufficiently low intensities of the controlling magnetic fields. To this aim, we use two nested fixed-point arguments relying on the Lagrange-multiplier formulation of the problem, a method which also suggests a numerical scheme. This talk is based on joint work with *Riccardo Durastanti* and *Lorenzo Giacomelli* (Sapienza - University of Rome).

Ort: Zoom video conference	Zeit: Freitag, 22.05.2020 um 10:15 Uhr

You are cordially invited to this lecture. Request the Zoom link from anja.schloemerkemper@mathematik.uni-wuerzburg.de

gez. Anja Schlömerkemper