Einladung zum Oberseminar Mathematik in den Naturwissenschaften

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

Jendrik Voss

Universität Duisburg-Essen

Morrey's conjecture for the planar volumetric-isochoric split

We consider Morrey's open question of whether rank-one convexity already implies quasiconvexity in the planar case. For this, we focus on the volumetric-isochoric split

$$W(F) = W_{\mathrm{iso}}(F) + W_{\mathrm{vol}}(\det F) = \widetilde{W}_{\mathrm{iso}}\left(\frac{F}{\sqrt{\det F}}\right) + W_{\mathrm{vol}}(\det F)$$

in isotropic hyperelasticity and give a precise analysis of rank-one convexity criteria. Starting from the classical two-dimensional criterion by Knowles and Sternberg, we show that the Legendre-Hadamard ellipticity condition separates and simplifies in a suitable sense.

We identify several "least" rank-one convex energies and, in particular, show that for energies with a concave volumetric part, the question of whether rank-one convexity implies quasiconvexity can be reduced to the open question of whether the rank-one convex energy function

$$W^{+}_{\mathrm{magic}}(F) = \frac{\lambda_{\max}}{\lambda_{\min}} - \log\frac{\lambda_{\max}}{\lambda_{\min}} + \log\det F = \frac{\lambda_{\max}}{\lambda_{\min}} - 2\log\lambda_{\min}$$

is quasiconvex. In addition, we demonstrate that under affine boundary conditions $W^{+}_{\mathrm{magic}}(F)$ allows for non-trivial inhomogeneous deformations with the same energy level as the homogeneous solution.

Ort: Zoom video conference	Zeit: Mittwoch, 07.07.2021 um 14:15 Uhr

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

gez. Anja Schlömerkemper