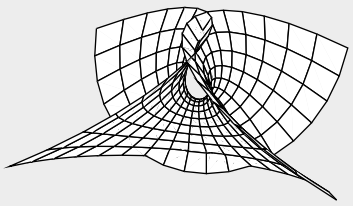

Einladung zum Oberseminar Mathematik in den Naturwissenschaften

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

Helmer Hoppe

TU Dresden

Homogenization of Rapidly Oscillating Manifolds and Γ-Convergence of Integral Functionals with non-Standard Growth

Families of manifolds have been studied intensively over the past years and numerous notions of convergence have been introduced, taking different aspects into account. Among them, the examination of the spectral properties of the Laplace-Beltrami operators and the behavior of minimizers of the associated Dirichlet energies turn out to be natural concepts to model the geometry from an intrinsic point of view.

The manifolds we consider feature special randomly oscillating structures, which allow us to associate the Laplace-Beltrami operators with differential operators on $\mathbb{R}^n$ of the form $-\operatorname{div}(\mathbb{L}\nabla)$ for some coefficient fields $\mathbb{L}$, in a way that the study of the spectral behavior of the Laplace-Beltrami operators translates into a stochastic homogenization problem for the coefficient fields.

We base our approach on a Γ-convergence statement of S. Neukamm, M. Schäffner and A. Schlömerkemper (2017) on discrete lattices, which we transfer to the continuum case $\mathbb{R}^n$ with some slight refinements. This statement provides Γ-convergence for integral functionals, whose integrands $W(x, \frac{x}{\varepsilon}, \nabla u(x))$ satisfy the non-standard growth condition

$$\lambda_{\min}(x,y)(\tfrac{1}{C}|F|^p - C) \leq W(x,y,F) \leq \lambda_{\max}(x,y)C(|F|^p + 1)$$

for some functions $\lambda_{\min}$, $\lambda_{\max}$ with bounded moments, i.e.

$$\sup_{x\in\mathbb{R}^n} \mathbb{E}\Big[\lambda_{\max}(x)^{\alpha} + \lambda_{\min}(x)^{-\beta}\Big] < \infty,$$

where $\mathbb{E}$ denotes the expectation with respect to a stationary and ergodic probability space. In fact, this result is much stronger than what is needed to establish spectral convergence of rapidly oscillating manifolds.

Ort: Zoom video conference	Zeit: Donnerstag, 05.11.2020 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