

Fachgebiet Analysis
Prof. Dr. Daniel Hauer
Prof. Dr. Friedrich Sauvigny

Fachgebiet Optimierung
Prof. Dr. Sabine Pickenhain

Fachgebiet Optimale Steuerung
Prof. Dr. Gerd Wachsmuth



Forschungsseminar Analysis und Optimierung Sommersemester 2026

Im Rahmen des Forschungsseminars spricht am **Donnerstag, den 12. November 2026**

Dr. Stephan Weis
Czech Technical University in Prague

Titel: Polyconvexity with Moments and Sums of Squares

Inhalt: Polyconvexity is an important property of energy densities in material modeling and non-linear elasticity. It allows preventing admissible deformations from compressing the material to a point and from changing the orientation. Convexity is too restrictive for this aim. Polyconvexity also guarantees mathematical well-posedness, ensuring that energy-minimizing deformations exist under growth conditions at infinity, given suitable boundary conditions. If the energy density is not polyconvex, then its polyconvex envelope is a mathematically stable relaxation that still respects important physical aspects.

Yet, computing the polyconvex envelope pointwise is generally difficult. Existing numerical approaches employ an infinite-dimensional moment problem and face significant challenges. We propose a numerical method to compute the polyconvex envelope of a polynomial energy density, based on the moment sum-of-squares hierarchy from polynomial optimization. Furthermore, we present a sufficient condition to certify polyconvexity via sum-of-squares technology.

Joint work with Giovanni Fantuzzi, Didier Henrion, Martin Kružík, Ajay Murali.

A preprint is available at <https://arxiv.org/abs/2604.11124>

Weitere Details zum Seminar: Der Vortrag findet in Raum HG 3.35 des Zentralkampus Cottbus der BTU statt.