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Non-Euclidean elasticity and asymptotic rigidity of manifolds

Abstract:

Liouville's rigidity theorem (1850) states that a map \( f : \Omega \subset \mathbb{R}^d \to \mathbb{R}^d \) that satisfies \( Df \in \text{SO}(d) \) is an affine map. Reshetnyak (1967) generalized this result and showed that if a sequence \( f_n \) satisfies \( Df_n \to \text{SO}(d) \) in \( L^p \), then \( f_n \) converges to an affine map.

In this talk I will discuss generalizations of these theorems to mappings between manifolds, present some open questions, and describe how these rigidity questions arise in the theory of elasticity of pre-stressed materials (non-Euclidean elasticity).

If time permits, I will sketch the main ideas of the proof, using Young measures and harmonic analysis techniques, adapted to Riemannian settings.

Based on a joint work with Asaf Shachar and Raz Kupferman.