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Non-Euclidean elasticity and asymptotic rigidity of manifolds

Liouville's rigidity theorem (1850) states that a map $f : \Omega \subset \mathbb{R}^d \rightarrow \mathbb{R}^d$ that satisfies $Df \in SO(d)$ is an affine map. Reshetnyak (1967) generalized this result and showed that if a sequence f_n satisfies $Df_n \rightarrow SO(d)$ 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 the Riemannian settings. Based on a joint work with Asaf Shachar and Raz Kupferman.