"An L^p Two-Well Theorem and Applications"

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ABSTRACT:

A classic theorem of Liouville states that a smooth mapping whose gradient is pointwise always in the set of rotations $SO(n)$ is an affine map. This a has recently received a powerful quantitative generalisation by Friesecke, James and Müller. Namely that a mapping whose gradient is L^2 close to $SO(n)$ must be close in $W^{1,2}$ norm to an affine map whose gradient is a rotation. This has had many applications and much work has been done to extend it. If $SO(2)$ is replace by a set of matrices K which has rank-1 connections, (i.e. there exists $A, B \in K$ with $A-B$ being a map of rank-1) the theorem is trivialy false. We will describe how for $K = SO(2) \cup SO(2)H$ a surprisingly strong version of the theorem holds for functions whose derivative does not oscillate more than by some fix constant. In the last part of the talk we will outline the main application for which this theorem was developed.