On the Monge-Ampere equation via prestrained elasticity.

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In this talk, we will present results regarding the regularity and rigidity of solutions to the Monge-Ampere equation, inspired by the role played by this equation in the context of prestrained elasticity. We will show how the Nash-Kuiper convex integration can be applied here to achieve flexibility of Holder solutions, and how other techniques from fluid dynamics (the commutator estimate, yielding the degree formula in the present context) find their parallels in proving the rigidity of Holder, Sobolev or Besov solutions.

A prestrained elastic body is a three dimensional elastic object, modeled in its reference configuration by an open domain and a Riemannian metric. This metric, by the main ansatz, is induced by mechanisms such as growth, plasticity, thermal expansion etc, and is the cause of the elastic deformation that determines the shape of the body. One can seek this deformation through a variational minimization principle, as the best possible immersion of the given Riemannian manifold into the flat space. For thin films, the characteristics of the original prestrain metric induce the distinct nonlinear theories in the singular limit of vanishing thickness, that determine the above mentioned minimizing deformation. A particular aspect of these limit theories are the curvature constraints that are manifested as the Monge-Amp\`ere equation in the appropriate energy regimes.