Singular Equilibria in Nonlinear Elasticity

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Abstract

This talk centres on discontinuous weak solutions to the equilibrium equations of nonlinear elasticity which may be interpreted as fractures forming in an initially perfect material. The approach is motivated by the fundamental work in [1] and the subsequent development in [4].

I will first give a brief introduction to the variational approach to nonlinear elasticity and review some necessary conditions for a minimiser. I will then present results on the existence and properties of singular equilibria using the distributional determinant and degree theory (see [4], [2], [5]) to characterise the set of admissible deformations. Finally, I will indicate applications of these ideas to modelling flaws in a material and propose a possible mechanism for the initiation of cracks (see [3]). (Much of the work presented is joint with S.J. Spector (S. Illinois).)

References

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