# VARIATIONAL DESCRIPTION OF STRESS CONSTRAINTS IN SIMPLE BODIES UNDERGOING LARGE STRAINS

## PAOLO MARIA MARIANO

## 1. ABSTRACT

In the talk I shall consider a simple body that is hyperelastic in large strain regime until the 3−covector defining the first Piola-Kirchhoff stress, once projected on the appropriate space of second-rank tensors, reaches a threshold indicating critical states. No information is given on the post-critical behavior. I shall present a theorem showing the existence of equilibrium configurations in which the constraint is satisfied. The related stress appears naturally as a measure over the deformation graph, where it satisfies an appropriate integral balance. Such a stress coincides with the first Piola-Kirchhoff one along regular parts of the deformation and can be concentrated over sets of vanishing volume such as dislocations or dislocation walls. Specific cases help in visualizing the result.

This part of the talk refers to a joint work with M. Giaquinta e G. Modica that will appear on the *Proc. Royal Soc. Edinburgh.*

I shall discuss also issues related to the interpretation of horizontal and vertical variations of functionals in terms of changes in observers. These changes involve the atlas in the whole space and are conceptually different from the classes of admissible motions for a material body. The choice of the latter class has constitutive nature, the former is just a change of coordinates in space, although it is a structural ingredient of a mechanical model. The difference, an aspect known even to beginners in mechanics, has non-trivial consequences.

(P. M. Mariano) DICeA, Università di Firenze, via Santa Marta 3, I-50136 Firenze, Italy

*E-mail address*, P. M. Mariano: `paolo.mariano@unifi.it`