Finite plasticity in P^TP

Ulisse Stefanelli

University of Vienna, Austria

The classical approach to finite plastic deformations prescribes the deformation gradient of the medium to be multiplicatively decomposed as FP where F stands for the elastic and P for the plastic strain, respectively. The requirement of frame-indifference imposes that the hyperelastic stored energy density is given in terms of the symmetric Cauchy-Green tensor F^TF only. Moving from this fact, I shall comment on the possibility of formulating the full finite plasticity model in terms of the corresponding plastic metric tensor P^TP. This situation is indeed common in applications and bears some relevant advantages with respect to the classical formulation in terms of P [2].

I will comment on the global existence of quasistatic evolutions for this model and on the possibility of rigorously ascertain the small-deformation limit via evolutive Γ-convergence techniques [1].

This work is in collaboration with Diego Grandi (Vienna).

References

[1] D. Grandi and U. Stefanelli, Finite plasticity in P^TP. Submitted, 2015.

[2] P. Neff and I.-D. Ghiba, Comparison of isotropic elasto-plastic models for the plastic metric tensor $C_p = F_p^T F_p$, arXiv:1410.2818, 2014.