"Micromechanics of inclusion-reinforced composites in elasto-plasticity and elasto-viscoplasticity: modeling and computation/"

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ABSTRACT

In this thesis, we propose some innovative developments for the implementation of mean-field homogenization schemes adapted to the prediction of the behavior of elasto-plastic and elasto-viscoplastic composites. For elasto-plastic materials, the local constitutive laws written in a rate form are linearized incrementally over several time-steps so that homogenization schemes developed in the context of linear elasticity can apply over each time interval. Since the original implementation gave too stiff predictions, we propose different stiffness reductions for the matrix tangent operator and study theoretically and numerically the influence on the final macroscopic prediction. Definition of the per phase reference state in also studied and linked to the fields heterogeneity effect. Predictions thus obtained are confronted with those of a secant (or total) formulation of the constitutive laws. For elasto-viscoplastic composites, we use the affine formulation which redu...
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