



IDENTIFYING PROCESSES GOVERNING DAMAGE EVOLUTION IN QUASI-STATIC ELASTICITY PART 1 - ANALYSIS

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Abstract. We present a quasi-static elasticity model that accounts for damage evolution based on the ideas of [27] and [40]. We show well-posedness of the resulting strongly nonlinear system of differential equations. The specific feature is the connection of displacements to damage evolution via a Nemytskii- or superposition- operator. From a material modelling perspective, the shape of this operator defines the aforementioned connection. The novelty in this work is the presentation of an inverse problem to identify the shape of this Nemytskii-operator. We establish the Fréchet-derivative of the forward operator as well as the adjoint of the derivative and characterize both via systems of linear differential equations. We prove ill-posedness of the inverse problem and provide a sufficient condition for the classical nonlinear Landweber method to converge.

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