

## **Semismoothness and other properties of elastoplastic operator**

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A system of non-linear equations is usually solved by Newton-like methods. Convergence of the methods depend on properties of the corresponding non-linear operator. The semismoothness of the operator is one of the important properties for the convergence.

In the first part of the presentation, the definition and some basic properties of semismooth mappings in finite dimensional spaces are summarized. Semismoothness of inverse and implicit functions is also mentioned.

In the second part, the so-called generalized projection onto a convex set is defined. Basic properties of the projective mapping are introduced. The semismoothness and a generalized derivative of the mapping are investigated for a special class of the convex sets.

In the third part, an initial-value constitutive problem for a wide class of elastoplastic models is presented. The problem is based on thermodynamical framework and contains linear elastic law, a general yield criterion, a simple combination of kinematic hardening and non-linear isotropic hardening and the principle of maximal plastic dissipation (the associative plastic flow and hardening rule).

In the fourth part, the initial-value constitutive problem is discretized by the the implicit Euler method and the corresponding one-time-step constitutive problem is formulated by the generalized projective mapping. The results of the second part are used to investigate properties of the constitutive elastoplastic operator.

In the fifth part, the one-time step elasto-plastic problem is defined with respect to unknown displacements. Such a problem is solved by finite element method which leads to the system of non-linear equations. The non-linear operator has a similar properties as the constitutive operator.

In the sixth part, some properties of scalar and tensor valued functions are summarized. Then the classical isotropic plastic criteria are introduced and semismoothness of the corresponding elastoplastic operators is investestigated within the proposed framework.