

Carstensen, C.; Klose, R.

Elastoviscoplastic finite element analysis in 100 lines of Matlab. (English) Zbl 1099.74544
J. Numer. Math. 10, No. 3, 157-192 (2002).

This paper provides a short Matlab implementation with documentation of the P_1 finite element method for the numerical solution of viscoplastic and elastoplastic evolution problems in 2D and 3D for von Mises yield functions and Prandtl-Reuß flow rules. The material behaviour includes perfect plasticity as well as isotropic and kinematic hardening with or without a viscoplastic penalisation in a dual model, i.e. with displacements and the stresses as the main variables. The numerical realisation, however, eliminates the internal variables and becomes displacement-oriented in the end. Any adaption from the given three time-dependent examples to more complex applications can easily be performed because of the shortness of the program and the given documentation. In the numerical 2D and 3D examples an efficient error estimator is realized to monitor the stress error.

MSC:

- [74S05](#) Finite element methods applied to problems in solid mechanics
- [65-04](#) Software, source code, etc. for problems pertaining to numerical analysis
- [65N30](#) Finite element, Rayleigh-Ritz and Galerkin methods for boundary value problems involving PDEs
- [74C15](#) Large-strain, rate-independent theories of plasticity (including nonlinear plasticity)

Cited in **15** Documents

Software:

[na14](#); [Matlab](#)

Full Text: [DOI](#)