Solving small-strain crystal plasticity without evaluating a return map

Yoshi Diepelt[1] Stefan Löhnert[2] Oliver Sander[3]

Solution methods of small-strain crystal plasticity commonly need to use an active set newton method to solve the constrained optimization problem of the widely used return map algorithm. We present the truncated nonsmooth multigrid newton method to solve a different formulation of small-strain crystal plasticity. Using methods of convex analysis, small-strain crystal plasticity is presented in its primal formulation. The resulting incremental optimization problem will be solved with the truncated nonsmooth multigrid newton method. We compare the primal formulation and algorithm to the formulation of the return map algorithm.

[1]Institut für Numerische Mathematik, Institut für Mechanik und Flächentragwerke, Falkutät Mathematik, Fakultät Bauingenieurwesen
jochen_david.diepelt@tu-dresden.de

[2]Institut für Mechanik und Flächentragwerke, Fakultät Bauingenieurwesen
stefan.loehnert@tu-dresden.de

[3]Institut für Numerische Mathematik, Falkutät Mathematik
oliver.sander@tu-dresden.de