Introduction to Computational Plasticity

Fionn Dunne, Nik Petrinic

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This book gives an introduction to computational plasticity and includes the kinematics of large deformations, together with relevant continuum mechanics. Central to the book is its focus on computational plasticity, and we cover an introduction to the finite element method which includes both quasi-static and dynamic problems. We then go on to describe explicit and implicit implementations of plasticity models in to finite element software. Throughout the book, we
describe the general, multiaxial form of the theory but uniquely, wherever possible, reduce the equations to their simplest, uniaxial form to develop understanding of the general theory and, we hope, physical insight. We provide several examples of implicit and explicit implementations of von Mises
time-independent and visco-plasticity in to the commercial code ABAQUS (including the fortran coding), which should prove invaluable to research students and practising engineers developing ABAQUS 'UMATs'. The book bridges the gap between undergraduate material on plasticity and existing advanced texts on nonlinear computational mechanics, which makes it ideal for students and practising engineers alike. It introduces a range of engineering applications, including superplasticity, porous
plasticity, cyclic plasticity and thermo-mechanical fatigue, to emphasize the subject's relevance and importance.

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