

Flow formulation viscoplastic FE analysis with boundary friction

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SUMMARY

The flow formulation approach to viscoplastic finite element analysis of stationary metal forming problems is extended to cases with strain rate and strain history sensitive material constitution.

Original numerical procedures are developed to determine particular point trajectories along which the strain rates are to be integrated. Corresponding expressions are derived under the assumption that the history of the state variables of some points is given by their current values at other points on the respective trajectory.

Boundary friction is introduced by having additional velocity - dependent external load acting on flow elements, and by introducing a narrow interface of neutral-behavior elements generating the frictional force on regular flow elements.

Corresponding 2D finite element routines for the material nonlinear analysis are developed and applied to idealized cold plane strain rolling and extrusion.
