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Application of the Return Mapping Algorithm to Perzyna Viscoplasticity for Plane Stress

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In the paper the elastic-viscoplastic constitutive relations of the Perzyna-type is investigated for plane stress problems. A fully implicit integration algorithm is adopted and the relevant expression of the consistent tangent operator for the von Mises yield criterion and flow functions of arbitrary type is derived. It is shown how the elasto-plastic rate equations of standard plasticity can be generalized to overstress-type models of viscoplasticity, where the stress point can be located outside the loading surface. Numerical example is given to reveal the differences and the similarities between the plastic and the viscoplastic overstress models.

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