International Journal for ENGINEERING MODELLING
Vol. 7, No. 1-2, 1994.

# Engineering applications of a novel geometrically nonlinear enhanced strain method

**Miroslav Schönauer**

*Institute for Numerical Methods in Engineering, University College of Swansea, Singleton Park, Swansea SA2 8PP, WALES, U.K.*

**SUMMARY**

A robust numerical model cast into a finite element formulation is presented, which can successfully simulate various engineering problems involving solid mechanics with high degree of geometrical, material and boundary (contact) nonlinearities. The model is numerically unified for rate independent (elasto-plastic) and rate dependent (elasto-viscoplastic) material constitutive laws. Introduction of a logarithmic strain based hyperelastic finite strain model in the context of a geometrically nonlinear assumed strain method characterizes the numerical treatment of incompressi-bility at large deformations. Consistent linearization in all aspects of algorithmic development provides robust and quadratically convergent solutions. This is shown in general 2-D numerical examples, where simulations from a variety of engineering fields, including metal forming, structural engineering and geomechanics, are performed.