

# Viscoelasticity with Internal State Variables at Large Strain Deformations

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Polymers, soft tissues and other materials can possess viscoelastic material behaviour, i. e. the deformation depends not solely on the amplitude of the external forces, but also on their rate. Also, this materials can reduce stresses or increase strains if the external forces remain constant over time. Of particular interest are the residual stresses in parts produced by injection moulding. These residual stresses can cause unfavourable warpage but, on the other hand, can also increase the strength of the material in some load cases. We present a theory of viscoelasticity at large strain deformations using internal state variables. Starting from a non-linear weak formulation, we examine the viscoelastic stress-strain relation, the evolution equation of the internal variable and the linearised system of equations. Some numerical results illustrate the viscoelastic behaviour.

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