

Viscoelasticity at Large Strain Deformations

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Injection moulding is a widely used process for mass production. But the geometry of the produced part matches not exactly the mould, due to shrinkage and warpage. This warpage originates from the cooling process from melting temperature to room temperature. Furthermore, thermoplastics exhibit viscoelastic behaviour between the melting temperature and the glass transition temperature. Additionally, viscoelastic materials reduce residual stresses over time. Thus, we have to consider a viscoelastic material model for the computation of residual stresses and the resulting warpage. Moreover, we want to include this computation in an optimisation procedure of the moulds.

We present a theory of viscoelasticity at large strain deformations. Starting from a non-linear weak formulation, we examine the viscoelastic stress-strain relation and the linearised system of equations.

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