

ELECTRO-VISCOELASTICITY OF DIELECTRIC ELASTOMERS – EXPERIMENT, MODELLING AND SIMULATION

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Dielectric elastomers belong to the group of so-called electroactive polymers, which can transform electric energy to mechanical energy, [1]. VHB 4910 is among the most popular materials within the group of dielectric elastomers, [3, 2, 6]. The phenomenological and micromechanically motivated constitutive models discussed in this contribution include nearly incompressible and time-dependent behaviour. In view of the micromechanically motivated model, a non-affine microsphere framework is elaborated to transform the statistical physics based constitutive models to a macroscopic continuum framework, [5]. The electromechanically coupled model is calibrated to experimental data for states under homogeneous and inhomogeneous deformation, [6]. Representative finite element examples show the applicability of the framework proposed which, as a long term goal, may contribute to the improvement of the design of dielectric elastomer based devices, [4].

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