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Thermoviscoelastic models for polyethylene thin films - DTU Orbit (08/11/2017)

Thermoviscoelastic models for polyethylene thin films

This paper presents a constitutive thermoviscoelastic model for thin films of linear low-density polyethylene subject to strains up to yielding. The model is based on the free volume theory of nonlinear thermoviscoelasticity, extended to orthotropic membranes. An ingredient of the present approach is that the experimentally inaccessible out-of-plane material properties are determined by fitting the model predictions to the measured nonlinear behavior of the film. Creep tests, uniaxial tension tests, and biaxial bubble tests are used to determine the material parameters. The model has been validated experimentally, against data obtained from uniaxial tension tests and biaxial cylindrical tests at a wide range of temperatures and strain rates spanning two orders of magnitude.

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