

## Experimental Investigation and Constitutive Modeling of Volume Strain under Uniaxial Strain Rate Jump Test in HDPE

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**Abstract :** In this work, tensile tests on high density polyethylene have been carried out under various constant strain rate and strain rate jump tests. The dependency of the true stress and specially the variation of volume strain have been investigated, the volume strain due to the phenomena of damage was determined in real time during the tests by an optical extensometer called Videotraction. A modified constitutive equations, including strain rate and damage effects, are proposed, such a model is based on a non-equilibrium thermodynamic approach called (DNLR). The ability of the model to predict the complex nonlinear response of this polymer is examined by comparing the model simulation with the available experimental data, which demonstrate that this model can represent the deformation behavior of the polymer reasonably well.

**Keywords :** strain rate jump tests, volume strain, high density polyethylene, large strain, thermodynamics approach

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