

European Solar Energy Storage

Rubber storage modulus code



Overview

Are viscoelastic moduli accurate in rubber friction models?

Up-to-date predictive rubber friction models require viscoelastic modulus information; thus, the accurate representation of storage and loss modulus components is fundamental. This study presents two separate empirical formulations for the complex moduli of viscoelastic materials such as rubber.

What is a storage modulus?

The storage modulus is a measure of how much energy must be put into the sample in order to distort it. The difference between the loading and unloading curves is called the loss modulus, E'' . It measures energy lost during that cycling strain. Why would energy be lost in this experiment?

In a polymer, it has to do chiefly with chain flow.

What is storage modulus in tensile testing?

Some energy was therefore lost. The slope of the loading curve, analogous to Young's modulus in a tensile testing experiment, is called the storage modulus, E' . The storage modulus is a measure of how much energy must be put into the sample in order to distort it.

Are complex modulus models based on dynamic testing of viscoelastic materials?

This study presents two separate empirical formulations for the complex moduli of viscoelastic materials such as rubber. The majority of complex modulus models found in the literature are based on tabulated dynamic testing data.

What is a complex modulus model?

The majority of complex modulus models found in the literature are based on tabulated dynamic testing data. A wide range of experimentally obtained

rubber moduli are used in this study, such as SBR (styrene-butadiene rubber), reinforced SBR with filler particles and typical passenger car tyre rubber.

What is a dynamic or complex modulus?

With the above definitions, the dynamic or complex modulus will have a real and an imaginary part. The real or storage modulus is defined as the ratio between the real part of the stress and the strain: By definition, the modulus of a material is considered as the overall resistance of the material to an applied deformation.

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TA Instruments, 109 Lukens Drive, New Castle DE 19720, USA

The determination of the storage modulus and glass transition temperature is often used to characterize the cure profile of rubber materials. Differences in these properties correspond to differences in cure.

Empirical Models for the Viscoelastic Complex Modulus with an

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Storage, loss modulus across

elastomer compounds

Storage moduli measured from 1 Hz to 45 Hz over the cross-section of three tire samples: a) Control, b) Tire No. 2 (air filled) and c) Tire No. 3 (nitro-gen filled).



Storage and loss modulus

The diagram shows the storage and the loss modulus of a NBR compound. This evaluation serves a comparison between the elastic and the viscous material behaviour.

Loss and storage modulus of rubber (schematic).

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4.8: Storage and Loss Modulus

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