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Reversible large amplitude planar extension of soft elastomers

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Publication date:
2010

Document Version
Publisher's PDF, also known as Version of record

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Citation (APA):

Jensen, M. K., Skov, A. L., Rasmussen, H. K., & Hassager, O. (2010). Reversible large amplitude planar extension of soft elastomers. Abstract from 82nd Annual Meeting of The Society of Rheology , Santa Fe, NM, United States.

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The Society of Rheology 82nd Annual Meeting

October 24-28, 2010 - Santa Fe, New Mexico

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Paper Number

MS2

Session

Polymer Rheology: Melts, Solutions and Blends

Title

Reversible large amplitude planar extension of soft elastomers

Presentation Date and Time

October 25, 2010 (Monday) 1:55

Track / Room

Track 2 / Sweeney B

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Text of Abstract

The newly developed planar elongation fixture, designed as an add-on to the filament stretch rheometer, is used to measure reversible large amplitude planar elongation on soft elastomers. The concept of the new fixture is to elongate an annulus by keeping the perimeter constant. The deformation on the cylindrical probe is measured using digital imaging, and it is found that the diameter drops a few percent only compared to the initial diameter. Additionally it is found that a new approximation to the Doi-Edwards (DE) model, without independent alignment, captures the experimental data very well. In particular it is observed that this new approximation reproduces the order of magnitude of the deformation on the cylindrical probe. In fact it is demonstrated that the deviation from an ideal planar extension of the cylindrical probe is highly sensitive towards the choice of strain tensor. When analyzing the measured stress data, it is observed that there is some elastic recovery when

reversing the flow. This is analyzed calculating the amount of work needed during the deformation, and it is observed that the sample itself contributes with work upon flow reversal.

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