

Review of Doctoral Thesis

MOLECULAR THEORY BASED MODELLING OF VISCOELASTIC POLYMER FLOWS

by

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Submitted thesis uses various viscoelastic models in fitting and predicting rheological behavior of polymer melts.

Rheological properties of several polymeric materials were determined in both shear and uniaxial elongational flows (steady as well as transient). For the theoretical investigation the Pom-Pom, eXtended Pom-Pom, novel Phan-Tien Tanner (PTT-XPP), and modified Leonov models were used.

Comments:

Introduction (background)

It appears to be in a reasonable extent and represents balanced amount of information needed to understand following papers.

Paper I

No remarks, however, it could be presented in a better graphical quality with larger and clear font.

Paper II

Similar to Paper I, better printing quality. There is an interesting note regarding the strain hardening capability of modified Leonov model. This is of practical interest – e.g. strain hardening at elongational deformation when applied to thermoforming!

Paper III

Very good job made when comparing different types of virgin and modified PP. Significant effect on extensional viscosity was observed. It is a pity that rheological fits were made for differential models only and m-Leonov model was not used for this purpose.

Paper IV

Valuable experimental verification of previous results performed on haul-off (Rheotens-like) apparatus. The author's conclusion about influence of branching on rheological effects seems to be well supported by his results.

The proposed thesis presents a remarkable piece of work. It has a positive impact to practical use of viscoelasticity in polymer processing. The way of applying author's knowledge of viscoelasticity is impressive.

I recommend the thesis to be accepted for the defense.



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ACCUFORM

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