



Wolfson Department of Chemical Engineering Seminar

Lecture Hall 6, Wolfson Department of Chemical Engineering,

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**A Novel Hierarchical Multi-Mode MSF Model for
Long-Chain Branched and Linear Polymer Melts**

Esmaeil Narimissa, Manfred H. Wagner

Polymer Engineering/Polymer Physics, Berlin Institute of Technology (TU Berlin)

Fasanenstrasse 90, 10623 Berlin, Germany

esmaeil.narimissa@rmit.edu.au

A novel Hierarchical Multi-Mode Molecular Stress Function (HMMSF) model for long-chain branched (LCB) polymer melts is proposed, which implements the basic ideas of (i) the pom-pom model, (ii) hierarchical relaxation, (iii) dynamic dilution, (iv) interchain pressure, and (v) convective constraint release relaxation mechanism. The capability of this approach is demonstrated in modelling the extensional (uniaxial and multiaxial) and shear viscosity data of numerous broadly distributed long-chain branched polymer melts with only a single non-linear parameter in extensional flow (the Dilution Modulus), and two non-linear parameters in shear flow (the Dilution Modulus and a Convective Constraint Release parameter). Moreover, the HMMSF model was further expanded to predict the extensional rheological behaviours of monodisperse, bidisperse and polydisperse Linear polymer melts with only one free parameter.

Related Publications

1. Narimissa E., Rolón-Garrido V.H., and Wagner M.H., A Hierarchical Multi-Mode MSF Model for Long-Chain Branched Polymer Melts Part I: Elongational Flow. *Rheologica Acta*, **54**, 9-10 (2015). doi: 10.1007/s00397-015-0879-2
2. Narimissa E., Rolón-Garrido V.H., and Wagner M.H., A hierarchical multi-mode MSF model for long-chain branched polymer melts part II: multiaxial extensional flows. *Rheologica Acta*, **55**, 4 (2016). doi: 10.1007/s00397-016-0922-y
3. Narimissa E. and Wagner M.H., A Hierarchical Multi-Mode MSF Model for Long-Chain Branched Polymer Melts Part III: Shear Flow. *Rheologica Acta*, **55**, 8 (2016). doi: 10.1007/s00397-016-0939-2
4. Narimissa E. and Wagner M.H., From Linear Viscoelasticity to Elongational Flow of Polydisperse Polymer Melts: the Hierarchical Multi-mode Molecular Stress Function Model. *Polymer*, **104**, (2016). doi: 10.1016/j.polymer.2016.06.005
5. Narimissa E. and Wagner M.H., A Hierarchical Multi-Mode Molecular Stress Function Model for Linear Polymer Melts in Extensional Flows. *Journal of Rheology*, **60**, 4 (2016). doi: 10.1122/1.4953442