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Filament Stretching Rheometry

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<p>Extensional flows are much more efficient than shear flows at orienting and stretching flexible polymers. Therefore extensional flows provide a very strong way of probing the non-linear dynamics of flexible polymers. Also several industrially important polymer processing operations involve extensional flows. For these reasons, the development of a reliable method for characterizing polymer melts in extensional flows has had considerable interest in the rheological community. Starting with the pioneering development of the Meissner Universal Extensional Rheometer [1] considerable activity has been devoted towards the development and application of extensional rheometers and the molecular interpretation of the measurements [2].</p> <p>This presentation will introduce the Filament Stretching Rheometer (FSR) as an instrumentation that may be used to produce reliable data of the nonlinear extensional rheology of polymer melts. Specific advantageous features of the FSR will be pointed out. Rheological measurements will be shown, both for model linear polymer systems and model branched polymer systems of known architecture. It will be demonstrated that the FSR is capable of producing real time measurements of stress in well defined up-start, stress relaxation and recovery flow fields. Results for the resulting extensional stresses will be compared with available model predictions. Finally the FSR technique will be compared with available commercial instrumentation for extensional rheology.</p> <p>[1] J. Meissner: Transactions of the Society of Rheology, 16 (1972) 405-420 [2] J. J. Linster, J. Meissner: Polymer Bulletin 16, 187-194 (1986)</p>			
ⁱ Dedicated to Professor J. Meissner			