

NOVEL TRENDS IN RHEOLOGY VIII

Zlin, Czech Republic

Meeting Report by Jeffrey Giacomini of Queen's University, Canada

July 30-31, 2019

The meeting began on Monday afternoon with an enjoyable bicycle ride first following the river, and then crossing over the hills from village to village, to return to Zlin before dark. Led by Martin Stěnička of Tomas Bata University and Wannes Sambaer of Donaldson in Leuven, participants enjoyed unforgettable vistas of the stunning Czechian countryside.

DAY ONE

As always, registration packets included a hardbound volume of conference proceedings, including 26 full length papers, edited by Martin Zatloukal and by Jan Musil, each of the meeting host Tomas Bata University [1]. In this 2-day, single-track meeting, 32 presentations were given from 10 different countries, here ranked by descending distance from Zlin: Japan, United States, Canada, Portugal, Sweden, Belgium, Germany, Austria, Slovakia and the Czech Republic.

Helmut Münstedt of Erlangen-Nürnberg opened the technical presentations with a thought provoking presentation on the role of melt elasticity in polymer processing. Meeting founder and organizer Martin Zatloukal produced a fascinating new study on fiber diameter distribution in melt blown fiber processing, a central feature of the process. In particular, Zatloukal explored the role of molecular architecture, and specifically, of long-chain branching on diameter distribution.

Masayuki Yamaguchi of the Japan Advanced Institute of Science and Technology gave a pair of interesting lectures. The first focussed on extensional strain hardening in polymer melts, wherein Yamaguchi offered microstructural explanations for his experimental observations. Yamaguchi immediately succeeded this talk with a detailed structure-property investigation of the elastic properties of molten polycarbonate blends.

José Covas of the University of Minho then delivered a lecture on in-process rheological measurement. The lecture included a passing reminiscence of the long departed Leszek Utracki, and deepened the audience's understanding of the role of mixing, dispersion and crosslinking in plastics extrusion. Dietmar Auhl (former student of Helmut Münstedt) of the Berlin University of Technology lectured expertly on melt flow and fusion processes in 3D printing. The discussion of fusion processes focussed interestingly on viscoelasticity in sintering.

Vitor Barroso of Borealis Polyolefine in Austria crafted a lecture to teach us about the viscoelasticity of industrial polymers. The lecture included a provocative treatment on engineering sag problems, for which the determination of the zero-

¹ NOVEL TRENDS IN RHEOLOGY VIII, Zlin, CZECH REPUBLIC (July 30-31, 2019). Zatloukal, M., and J. Musil, Eds., AIP Conference Proceedings, **2107**, ISBN 978-0-7354-1839-4 (July 30-31, 2019), pp. 1-243.

shear viscosity matters. Frederik Desplentere of KU Leuven reported on a novel shear-heating device for advanced characterization, especially of polymer melts in steady shear flow.

Jeffrey Giacomini of Queen's University in Canada presented on analytical solutions to shear stress growth. Paula Wood-Adams of Concordia University in Montreal presented on the use of oscillatory shear flow, for studying diffusion in polymers. This new method greatly accelerates diffusivity determination over mass difference or labelling techniques.

DAY TWO

Day 2 of the meeting featured the Vít Průša of Charles University in Prague thoroughly explored the addition of a stress diffusive term to classical viscoelastic models. Donggang Yao (姚冬刚) of Georgia Tech taught us about an exciting framework for nonlinear viscoelastic constitutive equations. Donggang bases this new framework on logarithmic strain and projected velocity gradient.

Fifteen posters were then presented, contributed by the Japan Advanced Institute of Science and Technology, Johannes Kepler University Linz (Austria), Brno University of Technology, SPUR in the Czech Republic, the Institute of Hydrodynamics CAS (Czech Republic), the Slovak University of Technology, the Institute of Macromolecular Chemistry CAS (Czech Republic), Tomas Bata University in Zlin, and the Czech Technical University in Prague. An international committee of Giacomini (chair), Wood-Adams, Barroso and Sambaer, chose Riza Saari of the Japan Advanced Institute of Science and Technology as best for her poster presentation on the effect of metal salts on poly(vinyl alcohol) structure and properties.

The meeting continued importantly with contributions from leading rheometer manufacturers. Lukas Schwab of TA Instruments in Germany lectured on the use of combined rheo-Raman analysis to deepen our understanding of macromolecular structure. Ansgar Frenkel of Thermo Fisher in Germany on rubber mixed with carbon black, analyzed with a torque rheometer. Michal Bartik of Anton Paar in the Czech Republic contributed a report on a versatile platform for dynamic analysis of solids or elastic liquids. Each of these three presentations were offered by meeting sponsors TA Instruments, Thermo Scientific (together with its Czech representative Pragolab) and Anton Paar.

Roland Kádár of Chalmers University of Technology reported from Sweden on the interesting interplay between transitions in large-amplitude oscillatory shear flow and network percolation. Kádár revealed how to use large-amplitude oscillatory shear flow to tell if a given single polymeric liquid is above or below its percolation concentration. Zdeněk Starý of the Institute for Macromolecular Chemistry CAS (Czech Republic) completed the meeting program for us with a lecture on carbon black filled systems, including especially morphology-rheology relations.

When asked about the conference, Martin Zatloukal said 'The biennial international conference 'Novel Trends in Rheology VIII'

(<http://noveltrends8.ft.utb.cz/>), has been organized by the Polymer Centre, Faculty of Technology, Tomas Bata University in Zlín in cooperation with the Applied rheology division, the Society of Plastics Engineers (USA), and the Czech Group of Rheology, which belongs to the Czech Chemical Society. All conference lectures were given by invited speakers which have been carefully selected to guarantee a very high level of both presentations and scientific papers. Each invited speaker was gifted with a framed certificate. There was special category called 'invited posters' whereas the regular poster submission was open for all registered participants. For the first time, the Best poster award was organized. During the conference, it was possible to visit exhibition at which novel experimental devices for rheological characterization of polymers were presented. The next meeting of this series (Novel Trends in Rheology IX) will be organized in July 27-28, 2021 (<http://noveltrends9.ft.utb.cz/>) and specific attention will be paid to applied rheology and polymer processing.'

Novel Trends in Rheology VIII

Zlín, Czech Republic • 30–31 July 2019

Editors • Martin Zatloukal and Jan Musil



Figure 1 Conference book.



Figure 2 Basilica of St. Cyril and Methodius at Velehrad village of the Czech Republic. The image was made by Alan Jeffrey Giacomini during the bicycle ride.



Figure 3 Masayuki Yamaguchi (left) receiving two certificates from Helmut Münstedt (right) for his lectures 'Strain-Hardening Behavior in Elongational Viscosity of Polyolefin Blends' and 'Effect of Flow Field on Structure and Properties for Polycarbonate Blends'.



Figure 4 José Covas (left) receiving the certificate from Helmut Münstedt (right) for lecture 'In-Process Rheological Measurements During the Manufacture of Multiphase Polymer Systems'.



Figure 5 Vitor Barroso (right) receiving the certificate from Paula Marie Wood-Adams (left) for lecture 'Rheological Methods for the Characterization of Viscoelasticity in Industrial Polymers'.

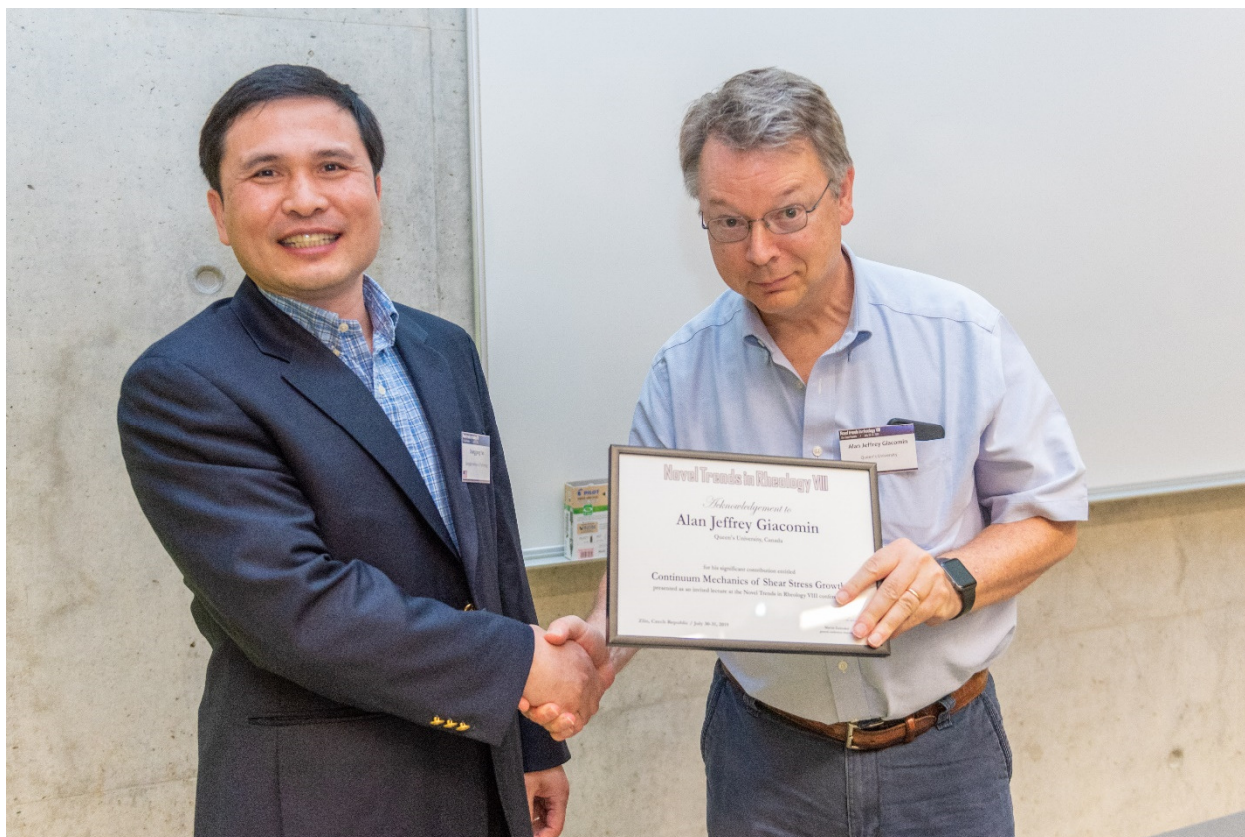


Figure 6 Alan Jeffrey Giacomini (right) receiving the certificate from Donggang Yao (left) for lecture 'Continuum Mechanics of Shear Stress Growth'.



Figure 7 Roland Kádár (right) receiving the certificate from Frederik Desplentere (left) for lecture 'Evidence of Percolated Network at the Linear - Nonlinear Transition in Oscillatory Shear'.



Figure 8 Dietmar Auhl (left) receiving the certificate from Helmut Münstedt (right) for lecture '3D-Printing Quality in Relation to Melt Flow and Fusion Behavior of Polymer Materials'.



Figure 9 Riza Saari (left) receiving the Best poster award from Alan Jeffrey Giacomini (right) for her poster 'Effect of Metal Salt Incorporation on Structure and Properties for Poly(Vinyl Alcohol) '.



Figure 10 Dinner.



Figure 11 Poster section.



Figure 12 Exhibition.



Figure 13 Conference room.



Figure 14 Refreshment.