

# NUMERICAL AND ANALYTICAL METHODS IN NON-NEWTONIAN FLUID MECHANICS

GUIMARÃES, PORTUGAL, JUNE 25-28, 2001

The aim of the Summer School in "Numerical and Analytical Methods in Non-Newtonian Fluid Mechanics" was to interest young researchers just coming into the fields of Rheology and Non-Newtonian Fluid Mechanics by helping to bridge the gap between the available theoretical tools and the existing problems of a mathematical nature in both Industry and Academia. The School had thirty-seven participants from eight European countries, which was taken as a sign of the high interest this subject arises in young researchers across Europe.

The School took place between June 25 and June 28, 2001, in Guimarães, Portugal, in the Azurém campus of the University of Minho, under the auspices of the International Centre for Mathematics and the Departments of Polymer Engineering and Mathematics of the University of Minho. The panel of lecturers was a distinguished one and was a major factor in the achieved success. The lecturers were:

- Prof. K. Walters, FRS, University of Wales
- Prof. A. R. Davies, University of Wales
- Prof. M. H. Wagner, Technical University of Berlin
- Prof. F. P. T. Baaijens, Eindhoven Technical University
- Prof. R. Keunings, Catholic University of Louvain
- Dr. G. Ianniruberto, University of Naples

The Programme kicked-off on Monday morning with a series of stage-setting lectures by Prof. Walters, immediately followed after lunch by lectures by Prof. Davies on *Linear viscoelasticity and Inverse Problems*. The first day was concluded by Prof. Wagner with an introduction to *Non-linear viscoelasticity* followed by a discussion on *Integral constitutive models*. Tuesday morning saw an introduction to *Differential constitutive models* by Prof. Davies and the first of the numerically minded lectures by Prof. Baaijens, who lectured on *Mixed FEM formulation for generalized Newtonian flows and the Application of SUPG and DG to the solution of the transport equation*. The day came to an end with a series of two lectures by Prof. Wagner on *Advanced integral models and Rheology and its applications to Polymer Processing*.

The third day (Wednesday) started with the last lectures by Prof. Baaijens on *Mixed FE methods for viscoelastic flow analysis and Stability*

*analysis of viscoelastic flows and its application to polymer melt flows*. The School then took a turn away from continuum mechanics and into molecular modelling with the two lectures by Dr. Ianniruberto on *Models of the polymer chain and dilute and semi-dilute solutions*, as well as the first lecture by Prof. Keunings on *Lagrangian particle methods for transient flows of differential fluids*, which concluded the proceedings on Wednesday. The final day of the School (Thursday) was taken up with the remaining lectures by Dr. Ianniruberto on *Concentrated solutions and melts and on branched polymers* and by Prof. Keunings on *The method of deformation fields for transient flows of integral fluids*, on *Stochastic simulation of rheometrical flows and on Micro-macro simulation of complex flows*.

Also included in the scientific programme were two Discussion periods. During the first of these, which took place on Tuesday (June 26) in the morning, the particular interests of the participants were debated so that some of the lectures could be focussed on those particular subjects. The second, which took place at the end of the School, consisted essentially on a debate on the upcoming developments in the area and on possible ways of increasing the interest of students at post-graduate and post-doctoral levels in the areas of Rheology and Non-Newtonian Fluid Mechanics.

The School also had a very active social side to it, since Guimarães in the early summer is a very pleasant place with a very diverse offer of activities to visitors. The highlight of the School, however, was a trip to the Port Wine Cellars, in Porto, on the Wednesday afternoon, followed by the School Dinner in a historical Pousada in the centre of Guimarães, which was accompanied by a very entertaining live display of Mediterranean music that was able to catch the full attention of audience for over one hour.

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## Conference Report II



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