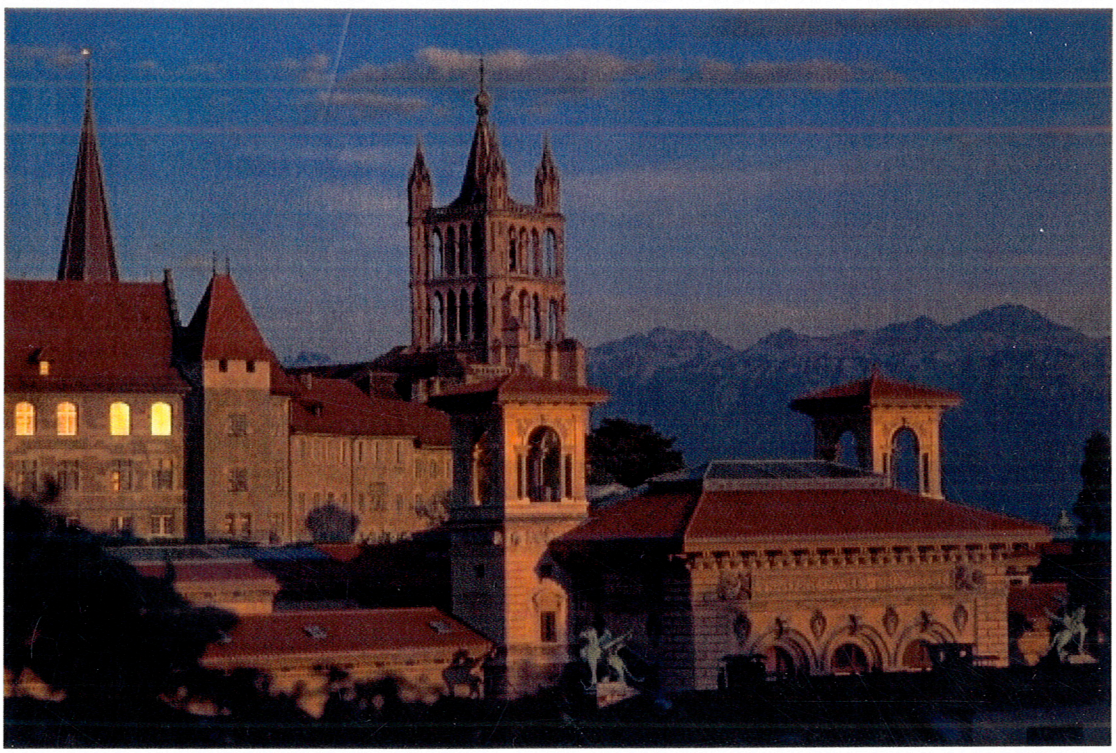
XIIIth International Workshop on Numerical Methods for non-Newtonian Flows

4-7 June 2003, Hôtel de la Paix, Lausanne, Switzerland



Laboratory of Fluid Mechanics
LMF
Laboratoire de Mécanique des Fluides

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1853-2003 FÉDÉRALE DE LAUSANNE

Saturday Morning, 7 June 2003

Breakfast 7:00 AM – 8:55 AM
Lectures 8:55 AM –12:10 AM

Macroscopic Constitutive Modelling and Benchmark Problems (Chairman : Jay Schieber)

8:55 AM – 9:15 AM
G. Mompean, L. Thais and L. Helin. Numerical simulation of viscoelastic flows using algebraic extra-stress models based on differential constitutive equations.

9:20 AM – 9:40 AM
Y. Fan. Boundary layers in the viscoelastic flow around a confined cylinder.

9:45 AM – 10:05 AM
M. A. Alves, P. J. Oliveira and F. T. Pinho. Flow of PTT fluids through contractions – effect of contraction ratio.

Break 10:10 AM – 10:30 AM

Theoretical Developments (Chairman : Raj Huilgol)

10:30 AM – 10:50 AM
X. Xie and M. Pasquali. A convenient way of imposing inflow boundary conditions in two- and three-dimensional viscoelastic flows.

10:55 AM – 11:15 AM
B. Caswell, G. E. Karniadakis and V. Symeonidis. The hole-pressure due to a tube on one wall of a plane channel.

11:20 AM – 11:40 AM
A. R. Davies, M. Al Hodaly and S. L. Huang. Transient decay rates in some common constitutive models of differential and integral type.

11:45 AM – 12:05 PM
M. Renardy. Jet breakup of a Giesekus fluid with inertia.

Group photograph 12:15 PM

Lunch 12:30 PM – 2:00 PM

Flow of PTT fluids through contractions - effect of contraction ratio

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A numerical study of the flow of a PTT fluid through sudden contractions is carried out, with view to quantify the effect of contraction ratio upon the flow characteristics (size and intensity of recirculation vortices). The relevant governing equations are solved for steady state solutions with a finite volume method. Interest is focussed on creeping flow and so the representation of the convection terms in the momentum equations is immaterial. However, the discretization of the convection terms in the stress equations is very important to guarantee adequate accuracy, and a new high resolution scheme developed by the authors [1] is explained and demonstrated in some detail. The Deborah number, defined in the usual way with velocity and length scales based on downstream duct values, is varied all the way from 0 to 200 and the resulting flow characteristics are analysed and represented under graphical form. It will be shown that an approximate universal correlation, valid for all contraction ratios, can be obtained if lengths are scaled with the upstream duct size, and the Deborah number is divided by the contraction ratio.

References

1. M. A. Alves, P. J. Oliveira and F. T. Pinho, A Convergent and Universally Bounded Interpolation Scheme for the Treatment of Advection, *Int. J. for Numerical Methods in Fluids*, **41** (2003) 47-75.