

Progress made in viscoelastic fluid mechanics

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Many presentations have been made on the development and the impact of constant viscosity elastic liquids and on the progress made in predicting the influence of elasticity in complex flows of viscoelastic fluids. The first major presentation in this area to an Australasian fluid mechanics conference was a keynote address presented at the 9th Australasian Fluid Mechanics Conference held in 1986 in Auckland [2]. A similar presentation was made at the 10th Australasian Fluid Mechanics Conference held in Melbourne in 1989 [1]. Here I am again, this time trying to bring you up-to-date on what has happened in viscoelastic fluid mechanics.

There are two recent papers to which you might refer if there is interest in this topic. The first, in Theoretical and Applied Mechanics in 1996 [8], looked at Newtonian elastic liquids and examined the effectiveness of predicting the influence of elasticity in slow (creeping) flows for constant viscosity elastic fluids. The flow fields examined included exit flow from a capillary tube and creeping flow around a sphere. A flow field not examined in that article was tubular entry flows [3], a topic of great interest in the numerical simulation community worldwide. The latest paper, published in Applied Rheology [7], examines the properties of low viscosity elastic liquids. The flow fields examined with these water-like elastic liquids include jet breakup, drop impact and swirling flows [9,10]. Swirling flow work is of particular interest because the interaction between inertia and elasticity in a relatively simple flow is examined. This presentation will use many photographs from *Rheological Phenomena in Focus* [4] to illustrate how important fluid elasticity can be in complex flows.

The latest work in drop formation, drop impact and the interaction between surfactants and polymers in viscoelastic fluids will also be discussed [5,6]. This latter work is of direct interest in the delivery of agricultural chemicals and in inkjet printing. A complete manuscript has not been written as everything to be presented is published elsewhere.

References

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