Dynamics of Complex Fluids: Proceedings of the 2nd Royal Society-Unilever Indo-UK Forum in Materials Science and Engineering. M.J. Adams, R.A. Mashelkar, J.R.A. Pearson and A.R. Rennie, Imperial College Press, 1998, 485 pp., £60.00, ISBN 1-86094-086-2.

This is the second set of proceedings to emerge from the very successful 6-month program entitled 'Dynamics of Complex Fluids', held at the Isaac Newton Institute for Mathematical Sciences in Cambridge. This is a remarkable venue, designed to encourage informal collaboration and discussion, and the breadth of these proceedings and the nature of the discussions reflect this atmosphere. While the first proceedings presented a tutorial focus, often from a physics-informed viewpoint, this second collection aims at a slightly more advanced level and has a somewhat broader spectrum of contributors.

In the introduction, the editors define complex as 'structural and rheological complexity' and fluids as 'coherent materials that can be deformed continuously'. These are broad definitions, and are applied as such in the book. The collection of contributed and invited manuscripts is divided by the editors into four categories.

- Viscoelasticity, incorporating traditional rheology and constitutive modelling (much of it computational) of polymer melts and solutions.
- Polymer and self-assembled fluids, featuring slightly more molecularly-informed treatments of dynamics of polymeric, liquid crystalline, and surfactant systems.
- Particulate suspensions, such as model spherical and rod-like suspensions, including blood, under sedimentation and flow.
- Viscoplasticity, including pastes, sand and soil, geotechnical materials, and other yield-stress 'fluids'.

Each section comprises 8–9 'chapters', each chapter being a single contribution.

Complex fluids has 'traditionally' (in its short tenure of a few decades) been the domain of physicists, chemical engineers, and physical chemists. However, many of the newer materials have significant overlap with mechanical and civil engineering (granular materials, sand and soil) and with geophysical (plate tectonics, layered media) disciplines. Applied mathematicians have also long contributed to the understanding of the unavoidable non-linearities inherent in the rheology of complex fluids. This is one of the few volumes which contains contributions spanning this wide range of disciplines. In addition to the diversity of researchers, approaches to modelling complex fluids vary from molecular to continuum, and these extremes often operate in exclusion from each other. The editors have consciously organised this book to recognise this dichotomy in an attempt to illustrate the complementary understanding that can emerge from considering both approaches. Hence, the book broadly swings from a continuum approach to molecular ideas and theories, and back to continuum modelling.

The papers are largely theoretical or computational, with 7 of the 33 presenting experimental results. They are split between presentations of particular results (for example, the contributions of Marrucci and Ianniruberto on convective constraint release, of Goddard on migrational instabilities, and of Harden and Cates on flow in adsorbed polymer layers) and more general reviews (for example, McKinley's discussion of instabilities in extensional rheology and Ottinger's review of Brownian dynamics simulations). There are contributions on instabilities in polymer melt and solution rheology, and on singularities in constitutive modelling. Several papers address the interface between continuum and meso-scale modelling (Brownian and micro–macro approaches). In addition to FENE-type dumbbells, there are molecular discussions of polymer melts, solutions, brushes, and associating networks. The studies of suspensions include both continuum (Langevin) and molecular approaches; while the discussion on yield stress and plastic materials is largely constitutive.

The editors have done an admirable job in sensibly ordering the material (choosing from many possibilities), and ensuring common and clear typesetting in all manuscripts (hodgepodge typesetting makes so many proceedings uncomfortable to read). They have also provided a useful introduction and index. The best feature is the paragraph or so of objective and accurate summary which precede each paper. A final useful feature is the inclusion, as in the well-known Faraday discussions series, of questions and answers at the end of the invited lectures. The exchanges are never boring, are often humorous, and are always successful in providing useful reference points and a framework for critical reading. In some cases, much can be gained by skimming the manuscript, reading the discussion in detail, and then backtracking with the comments in mind.

It is not the place of proceedings to present comprehensive treatments, but rather to provide a subjective snapshot of the current state of the art in a particular field. This collection succeeds in this goal; the material and approaches are contemporary and, while some detailed discussion is presented, most contributions give enough highlights to illustrate the main results, coupled with a reflective overview and valuable pointers to the current literature.

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Guidelines for Pressure Relief and Effluent Handling Systems. Centre for Chemical Process Safety (CCPS), American Institute Of Chemical Engineers, 1998, 538 pp., £121 plus £3.33 VAT on the CD-ROM included with the book, ISBN 0-8169-0476-6.

The sizing of pressure relief systems and their associated effluent handling equipment is probably one of the most academically demanding tasks that will be carried out by practising engineers. It requires a detailed understanding of thermodynamics and fluid flow in all cases and, in some cases, it also requires an understanding of reaction kinetics. Some of the design procedures are an integral part of mandatory or quasi-mandatory standards. Other information has in the past been found only in conference proceedings or published papers. Few practising engineers will have access to all of the published literature and in many cases they will be confused by some of the apparent contradictions in the information that they do have available. A book that seeks to bring together the most appropriate design methods and form a 'one stop shop' for the designer, has been required for sometime. Earlier books such as that by Parry, moved in this direction but this book by the AIChE goes all the way.

The second chapter is particularly useful for discussing all the design methods for sizing pressure relief systems. Although published by an American organisation, the authors have recognised the existence of the rest of the world by citing a wide range of international standards and highlighting the differences. They have also succeeded in reducing, if not completely eliminating, the confusions arising from the different methods of calculating the heat input from a fire.

The third chapter is perhaps the most important since it covers the sizing of relief devices. Unfortunately I found it the most muddled. At times it was the intellectual equivalent of wading through treacle. Much of the problem arose because computer methods were presented alongside hand calculation methods. These methods may have been better presented in separate chapters. The confusion is sadly compounded by a number of typographic errors and confused symbology within the equations. On the positive side, most of the equations presented in this chapter are accompanied by examples and there are a number of explanatory diagrams. Most of the basic calculations that have been carried out using computer software use the programs that are provide in the CD-ROM that accompanies the book. The use of these programs is explained with appropriate examples. Crucially, the book covers two-phase relief along with many of the design methods arising from the $\mathscr{DIERS}$ programme.

The inclusion of computer software tied into the design procedures within the book is, in my opinion, a good idea. However, the exclusion of some hand calculation methods from the book, on the basis that the computer program is the preferred method, is not a good idea. Many people purchasing the book will not have a computer with a CD-ROM drive and/or Windows 95. The hand calculation would allow them to make the calculation even if the results were somewhat conservative. Turning to the computer software included, those familiar with the latest graphic user interfaces will find the programs on the CD-ROM somewhat of a disappointment. However, the authors seem to have chosen a software that is well proven and available at a sensible price.

The second section of the book covering effluent handling systems is well written and easy to follow. It covers sizing the system for the best estimate flow rate rather than the calculated relief flow for relief device sizing. Handling equipment includes gravity separators, cyclones, quench pools, absorbers, release to atmosphere and flare systems. The inclusion of quench pools is interesting because the authors admit that quench pools have not, to date, been used in significant amounts in the chemical industry although they have been used extensively in the nuclear industry. Their inclusion in such an authoritative book will almost certainly change this situation.

This book succeeds in being a 'one stop shop' with design methods covering all aspects, discussions on the acquisition of design data, methods of estimating the physical properties of mixtures, detailed references, a glossary of terms plus the inclusion of computer software. In my opinion, this book will become the 'Bible' for designers of relief systems and may become as ubiquitous as Perry.

In spite of the gripes, my verdict is, "Buy it".

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Atmospheric Dispersion. European Process Safety Centre, Institution of Chemical Engineers, UK, 1999, 320 pp., hardback, £99.00, ISBN 0-85295-404-2.

Process safety and loss prevention are matters of interest to all, and the European Process Safety Centre, therefore, aims to link industrial R and D forces in these areas. As part of this work the EPSC has translated one of several safety guidelines written by the Union de Industries Chimiques. The resulting book gives a broad introduction to dispersion of toxic and flammable gas clouds including the phenomenon of heavy-gas dispersion where horizontal spreading is driven by gravity and vertical mixing is reduced by density stratification (www.risoe.dk/vea-atu/densegas). The book is written for the risk engineer, who needs to understand the concepts and limitations of dispersion models, related source models and mitigation methods. It also discusses application of wind statistics and how to assess spatial distribution of the risk.

The use of meteorological data is illustrated by a 30-year wind climatology supplied by a national meteorological office. The chosen data set is clearly influenced by local topography, and it would have been natural to discuss how to correct for flow distortion and how to predict the wind speed distribution at a location with different local topography. Such methods are currently used for wind turbine siting (www.wasp.dk).