

## **Preface to complex flows and complex fluids**

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This issue is dedicated to the flow of complex fluids. “Complex fluids” is either an ill-defined or all-encompassing terminology. In its current usage “complex fluids” has come to mean flows of materials that may be non-Newtonian and/or multi-phase and/or multi-scale in terms of constitutive description. These fluids occur in many industrial engineering situations as well as naturally and are studied by engineers, mathematicians, physicists and many others.

In 2009–2010 “the Institute of Mathematics and its Applications” (<http://www.ima.umn.edu/>) ran a thematic year under the same title as this issue. It is not surprising that these flows have attracted the attention of mathematical scientists. In the same way that classical fluid mechanics provided the melting pot and motivation for developments in asymptotic methods, applied analysis, dynamical systems and numerical analysis, complex fluid phenomena bring forward a new selection of difficult and interesting problems (instabilities, multi-scale constitutive modelling, non-local effects, massive computations, etc.). Facing these challenges requires a combination of innovative new techniques and the application of existing techniques to new and developing problem areas. The issue is intended to offer a snapshot in time of some of these developments, with a mix of problem-focused studies and more general reviews.

Guest Editors

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