

**02-1 IUTAM Symposium on Micromechanics of Fluid
Suspensions and Solid Composites
Austin, Texas, USA 3 – 5 April 2002**

a) Scientific Committee

R. Bonnecaze (USA, Chair), G. Rodin (USA, Co-Chair),
Z. Hashin (Israel, Co-Chair), B. Freund (USA, IUTAM
Repres.), A. Acrivos (USA), J. Brady (USA), E. Guazzelli
(France), N. Phan-Thien (Singapore), P. Suquet (France),
J. Willis (United Kingdom)

b) Short summary of scientific progress achieved

This IUTAM symposium focused on bringing together fluid and solid mechanicians working on various aspects of fluid suspensions and solid composites. These multiphase materials are ubiquitous in nature and of course are at the forefront of modern fluid and materials processing. The major aim of the symposium was for the two communities to share their perspectives and experimental, theoretical and computational techniques on these classes of problems. Secondary aims were to promote inter-disciplinary work that integrates experimental, computational, and analytical components, and identify major open problems, critical experiments, and benchmarks.

The topics covered in the Symposium included:

- Large-scale micromechanical simulations
- Localization, boundary layers, size and statistical effects
- Imaging and experimental characterization
- Non-linear behavior

Twenty-four oral presentations were presented in this Symposium. The major aim of bringing the two groups together to share their perspectives was clearly met. Many participants remarked on how interesting and stimulating were the talks from their colleagues from other disciplines. The secondary aims were only partially met, but overall the Symposium was successful judging from the oral feedback of the participants.

c) Countries represented and number of participants

The meeting attracted 40 participants from 8 countries: Austria, Canada, Denmark, France, Russia, The Netherlands, United Kingdom, USA

d) Publication of Proceedings of the Symposium

The proceedings of selected papers in the symposium will be published in a special issue of the *Philosophical Transactions: Mathematical, Physical & Engineering Sciences* in May 2003.

e) Financial supports

The Symposium was sponsored by the following organizations:

- . International Union of Theoretical and Applied Mechanics
- . Texas Institute of Computational and Applied Mathematics
- . University of Texas
- . Frank A. Liddell Fellowship in Chemical Engineering

We are grateful for the support of our sponsors.

f) Scientific program

Day 1 Talks

- J. Brady, *Accelerated Stokesian dynamics*
- A. Zinchenko, *Large-scale simulations of concentrated emulsion flows*
- A. Sangani, *Effect of bubble-wall interactions on properties of bubble suspensions*
- E. Asmolov, *Numerical simulation of sedimenting homogeneous suspension*
- H. Böhm, *Unit cell studies on the thermomechanical behavior of discontinuously reinforced metal matrix composites*
- M. Bornert, *Pattern-based modelling of composite materials; principles, applications and limitations*
- G. Milton, *The complete characterization of the possible (average stress, average strain) pairs in a porous solid*

R. Davis, *Solid-solid contacts due to surface roughness and their effects on suspension behavior*
J. Fortin, *A micromechanic study of granular material*

Day 2 Talks

W. Drugan, *An exact Hashin-Shtrikman nonlocal constitutive equation for random linear elastic composite materials*

P. Ponte Castaneda, *Field fluctuations in nonlinear homogenization and applications to localization in porous media*

A. Acrivos, *Statistical properties of sheared suspensions from numerical simulation*

D. Joseph, *Slip velocity and lift*

X. Li, *Simulation of suspension film flow down an inclined plane*

A. Cherkaev, *Dynamics and failure of structures with reserved resistance*

R. Lipton, *Homogenized failure criteria and the design of composite structures for maximum strength and stiffness*

T. Zohdi, *Genetic design of solids possessing random particulate microstructure*

M. Ostoja-Starzewski, *Random formation versus inelastic response of paper*

I. Sevostianov, *Explicit correlation between anisotropic elastic and conductive properties for materials containing annular cracks*

Day 3 Talks

J. Morris, *Band dynamics in free surface-induced segregation of a suspension*

J.-P. Matas, *Influence of particles on the transition to turbulence in a pipe flow*

J. van Mier, *Development of shrinkage microcracks in model concretes: experimental evaluation of time and length scales*

O. Sigmund, *Design of extremal materials for stability and wave-propagation*

A.B. Movchan, *Discrete and continuous dynamic structures, filtering and polarization of elastic waves*

Report composed by Roger Bonnecaze