Australian Society of Rheology

2013 Rheology Lecture Series

In 2013 the Australian Society of Rheology (ASR) is presenting a lecture series which is open to anyone interested in the flow and deformation of matter. The next lecture in the series is at Swinburne University of Technology.

DATE: Wednesday, 13th November, 2013

TIME: 5:30-6:00 pm: Refreshments (nibbles and drink)
6:00-7:00 pm: Presentation

SPEAKERS:
Professor John Sader (The University of Melbourne)
Ms Hui-En Teo (The University of Melbourne)

VENUE: Swinburne University of Technology
Refreshments will be served first in room EN612 (staff common room), Engineering Building (EN), Swinburne University of Technology, John Street, Hawthorn 3122.
Lectures take place in room EN406, Engineering Building (EN).

Transport and Parking
Swinburne is located in Hawthorn and is adjacent to both Glenferrie Road and Burwood Road. The most readily accessible public transport is via train with regular services on any of the Belgrave, Lilydale, Alamein, Ringwood or Blackburn lines. Exit at Glenferrie Station. The University is immediately adjacent to the station. Car parking is available either in the multistorey car park on Wakefield Street, or else in a number of public car parks along Glenferrie or Burwood Roads. See the attached map for information.

For enquiries please contact Prof. Billy Todd, (03) 9214-8740 or E-mail: btodd@swin.edu.au

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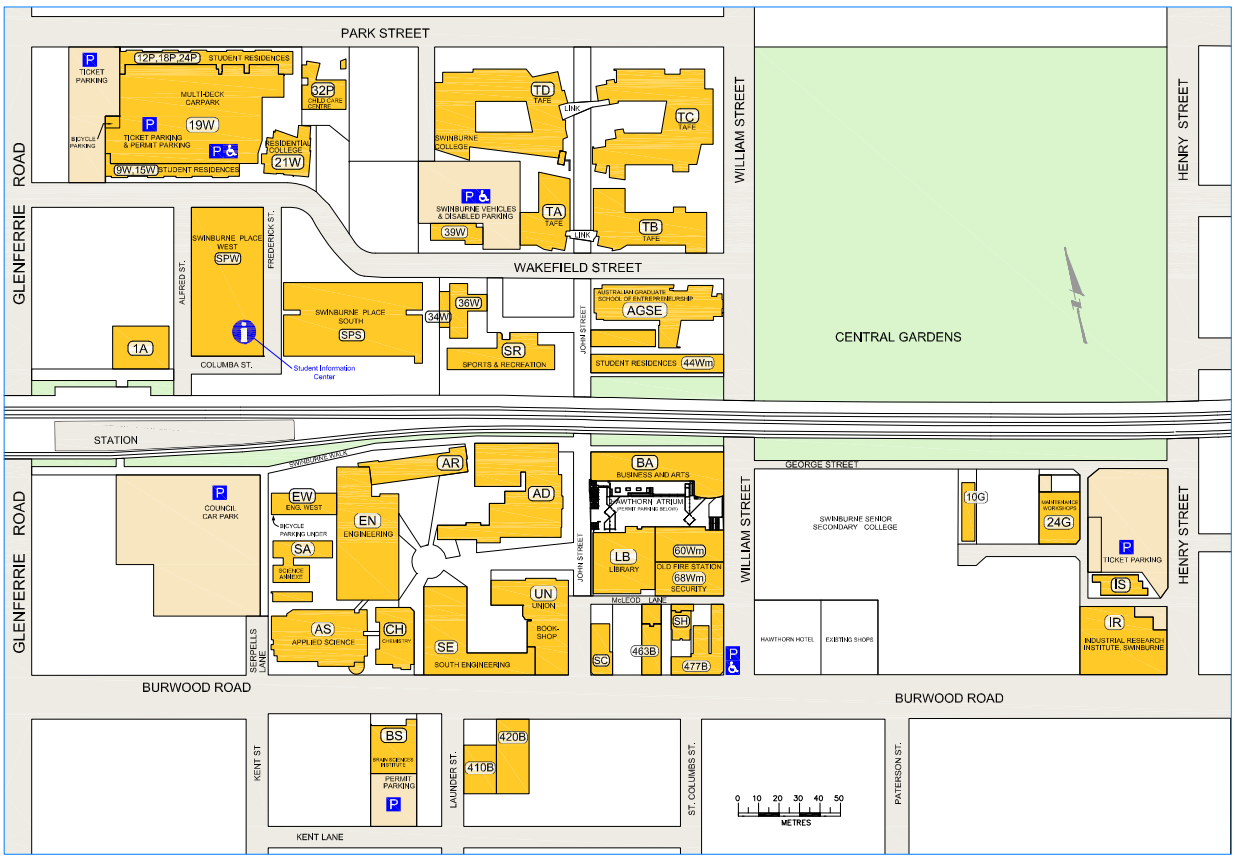

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Chaplain	477B (Rear)
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Counselling	34W
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Facilities & Services Group - Operations	10G
Facilities & Services Group - Workshop	24G
Finance	SPW
Gymnasium (Swinergy)	SR
Human Resources	SPW
Information Technology Services - Main Office	SPS
International Student Unit	SPW
Library	LB
Mail Centre	1A
Medical Centre	SH
Muslim Prayer Room	39W
Security	68Wm
Student Operations	SPW
Student Information Centre	SPW
Student Residences - Reception	21W
Student Services	36W
Swinburne Industry Solutions	60Wm
Swinburne International & Development	SPW
Swinburne Legal	60Wm
Swinburne Place Student Accommodation - Reception	SPS
Swinburne Press (graphics dept.)	AD
Swinburne Student Union (SSU)	UN
Swinburne Student Amenities Association (SSAA)	UN
TAFE Reception / Directorate	TD

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Engineering & Industrial Sciences, Faculty of	EN, SE
Information & Communication Technologies, Faculty of	EN, AD, 420B
Life & Social Sciences, Faculty of	AS

INSTITUTES & SPECIALIST CENTRES	BLDG
Advanced Internet Architectures, Centre for (CAIA)	EN
Astrophysics and Supercomputing, Centre for	AS
Atom Optics & Ultrafast Scetroscopy, Centre for	AS
Business Work & Ageing Centre for Research	463B (Rear)
Brain Sciences Institute	BS
Emerging Technologies & Society, Aust Centre for (ACETS)	SE
Entrepreneurship, Australian Graduate School of	AGSE
Environment & BioTechnology Research Centre	AS
Industrial Research Institute Swinburne	IR
Information Technology Research, Centre for (CITR)	EN
Microphotonics, Centre for	AS
Molecular Simulation, Centre for	SA
New Manufacturing, Centre for	TB
Research, Graduate School of	60W
Sustainability, National Centre for	TA
Sustainable Infrastructure, Centre for	EN
Swinburne College	TD
Swinburne Institute for Social Research	477B, 1A
Swinburne Knowledge	60Wm

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BUILDING NAME	BLDG
1 Alfred St	1A
10 George St	10G
24 George St	24G
32 Park St	32P
34 Wakefield St	34W
36 Wakefield St	36W
39 Wakefield St	39W
60 William St	60Wm
410 Burwood Rd	410B
463 - 465 Burwood Rd	463B
477 Burwood Rd	477B
Old Administration Building	AD
Applied Sciences Building	AS
Arts Building	AR
Australain Graduate School of Entrepreneurship	AGSE
Brain Sciences Building	BS
Business & Arts Building	BA
Chemistry Building	CH
Citadel (420 Burwood Rd)	420B

BUILDING NAME	BLDG
Engineering Building	EN
Engineering - West Wing	EW
IRIS Buildings	IR / IS
Library	LB
Multi-Deck Car Park	19W
Security (Old Fire Station)	68Wm
Science Annexe	SA
South Engineering	SE
Sports & Recreation Centre	SR
Student Health	SH
Student Residences - Park St	12P, 18P, 24P
Student Residences - Wakefield St	9W, 15W, 21W
Student Residence - William St	44Wm
Swinburne Place - South Building	SPS
Swinburne Place - West Building	SPW
TAFE Building A	TA
TAFE Building B	TB
TAFE Building C	TC
TAFE Building D	TD
Union Building	UN

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Swinburne University of Technology
Hawthorn Campus
John Street, Hawthorn
P.O.Box 218
Hawthorn, Victoria 3122
Tel : 03 9214 8000
Fax : 03 9819 5454

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1. Professor John Sader
Department of Mathematics and Statistics, The University of Melbourne, Victoria 3010, Australia

Title: Fluid-Structure Interaction at Nanometre Scales

Abstract: Miniaturisation of resonant mechanical sensors has led to unprecedented resolution, including the ability to image surfaces and measure mass at the atomic level. For applications in biology and environmental sensing, characterisation of the fluid-structure interaction of these small-scale devices is essential. In this presentation, I shall discuss recent work in my group aimed at modelling the fluid-structure interaction of nanometre-scale mechanical devices, in gas and liquid. This will include a comparison of the developed theories with measurements performed at the Argonne National Laboratory, California Institute of Technology and the University of Chicago.

2. Ms Hui-En Teo
Particulate Fluids Processing Centre, The University of Melbourne, Victoria 3010, Australia

Title: Understanding the yield behaviour of suspensions under combined shear and compressive loads

Abstract: Understanding the flow behaviour of particulate fluids is essential for optimising industrial suspension processing. To that end, suspension rheology research has resulted in the characterisation of yield behaviour through two key material properties: the shear and compressive yield stress, σ_y and p_y. These parameters give a viscoplastic description of yielding in concentrated suspensions above the gel point. As p_y is typically an order or two greater than σ_y, the effect of one on the other can be ignored in predominantly one-dimensional processes such as pipeline flow of non-settling suspensions and pressure leaf filtration. However, great difficulty is faced when attempting their application into multi-dimensional processes which are not properly understood rheologically. Such combined loading operations, like roll compression, raked thickening and belt filtration, occur in many industrial processes.

As a first step towards modelling multi-dimensional processes, the constitutive behaviour of suspensions under combined shear and compression is sought. Individual requirements for the accurate determination of σ_y and p_y are the avoidance of wall slip in shear and the application of differential pressure in compression. Taking these into consideration, the experimental method employs an ARES rheometer loaded with a sintered disc and dead weights. Exploration of the effect of compression on material shear properties was conducted on a model inorganic calcite suspension. From controlled rate stress relaxation data, the shear modulus $G(t)$ and strain softening function $h(\theta)$ were extracted and compared. The sub-yield behaviour from constant rate tests was also fitted to a standard linear solid (SLS) model. It was observed that under the two types of rheometric testing, shearing under minor compression resulted in higher stress peaks and quicker stress dissipation than in the unloaded case. The development of transient force chains within the suspension is postulated to affect the stress behaviour of the sheared material. These findings point to significant interaction between shear and compressive loadings in suspensions.

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