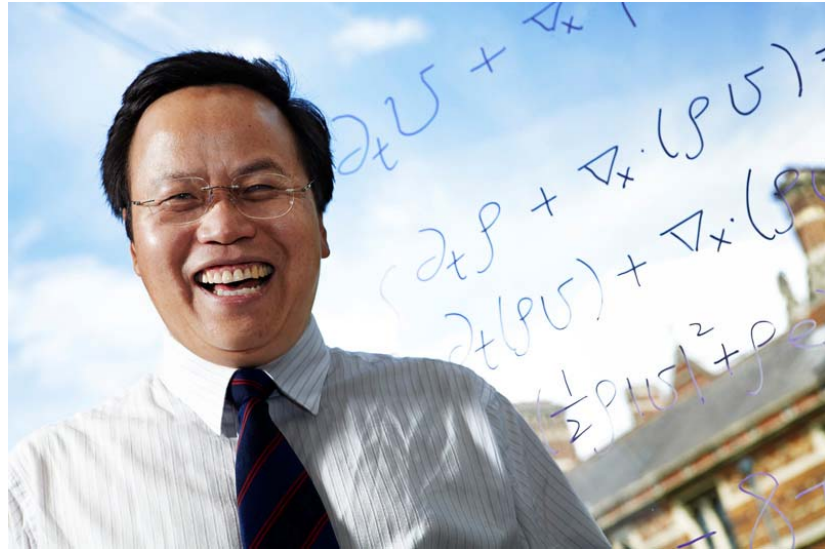


Advanced Studies Centre

News from Michaelmas term

Prof. Gui-Qiang Chen wins international mathematics prize

Congratulations to Prof. Gui-Qiang Chen, Keble Fellow in Mathematics and Nonlinearity Cluster member, recipient of the 2011 SIAG/APDE Prize for his contribution of a theory to the understanding of shock reflection and its application in potential flow and similar nonlinear problems. This prize, granted by the Society for Industrial and Applied Mathematics (SIAM), is a major honour in applied mathematics.



About Prof. Chen's winning work

Shock waves are fundamental nonlinear waves in nature. They are often generated by solar winds (bow shocks in space to protect us/Earth from these winds), supersonic or near sonic aircrafts (transonic shocks around the body or supersonic booms with transonic shocks), explosions (blast waves), and various other natural processes. When a shock impinges an obstacle (steady or flying), shock reflection-diffraction phenomena occur.

One of the most fundamental scientific problems is shock reflection-diffraction by wedges, especially wave patterns of reflection-diffraction around the wedge. The complexity of reflection-diffraction configurations was first reported by Ernst Mach in 1878, who observed two different patterns of reflection-diffraction configurations. Their fundamental importance in applications has attracted many mathematical scientists including von Neumann,

Lighthill, Courant-Friedrichs, Bethe, as well as many experimental scientists, to conduct extensive research into all aspects of shock reflection-diffraction phenomena via various interdisciplinary approaches. It has been found that the situations are much more complicated than what Mach originally observed. Various other patterns of shock reflection-diffraction can occur. On the other hand, shock reflection-diffraction configurations are the core configurations in the structure of global entropy solutions for one of the most important classes of nonlinear partial differential equations—hyperbolic conservation laws. In this sense, shock reflection-diffraction phenomena have to be understood from a purely mathematical point of view. This has not previously been achievable. In the paper, Professor Chen and his collaborator succeeded in developing a new mathematical theory to overcome several core mathematical difficulties involved and to establish

the existence and stability of a solution for this problem, which has long defied careful mathematical analysis. The findings described in the paper contribute to a new understanding of the behaviour of shock waves that arise in many areas in science, engineering and industry. A range of applications could benefit from the research, in areas such as aerodynamics, hydrodynamics, hydraulics, astrophysics, space science, inertial confinement fusion, the safe controlling of detonations, and many others. The ideas, techniques, and approaches developed in this paper will have wide future uses in solving other problems and open up many new areas of research.

More details on Prof. Chen's work can be found in: Chen, G.Q., Feldman, M. (2010) Global solutions of shock reflection by large-angle wedges for potential flow. *Annals of Mathematics* 171 [2] 1067-1182.

Meetings and events

European COST meeting held at Keble



COST meeting participants at Keble

The Final European COST (Cooperation in Science and Technology) Meeting on “Metal Complexes for Imaging” was held last September at Keble. This meeting, organised by Prof. Stephen Faulkner, Keble Fellow in Inorganic Chemistry, provided a series of interesting lectures focussed on the use and development of new metal-based systems for application in

molecular imaging. Paper contributions covered mostly the use of the lanthanide metals, addressing the chemistry of lanthanide contrast agents (also referred as contrast probes or labelling agents). This included the synthesis and characterisation of new lanthanide complexes for bimodal imaging, as well as new advances and perspectives on their use within supramolecular systems

for multimodal sensing. Other contributions from this meeting included interesting applications on the use of radiometals (nuclear medicine) to label peptides for tumour targeting in humans. The international research presented exposed the state-of-art in the development and application of molecular imaging, generating new ideas for research and opportunities for collaboration.

The Lanthanide elements in Imaging

Ions of the lanthanide elements and their complexes have been widely used in the last decades in biochemical research and biomedical imaging. They form responsive luminescent stains to enhance the intensity of the images produced by optical and luminescence microscopy and magnetic resonance imaging (MRI) providing high sensitivity imaging. Current research is looking at developing a new generation of lanthanide complexes which are simultaneously sensitive to multiple imaging techniques enabling multimodal sensing, particularly important in biomedical imaging.

More on the Imaging Cluster

Last September, Dr Peter Caravan, Harvard Medical School, gave a special talk entitled “Molecular Imaging: New Probes, Devices and Applications” where he exposed his current work with gallium ions.

The Imaging cluster has also welcomed Drs. Bríd Cronin, Simon Butt and Prof. Peter Kohl as members. Drs. Cronin and Butt, current Keble Fellows in Chemistry and Neuroscience respectively, have been actively participating and contributing to the cluster’s events. Prof. Kohl, former Keble Research Fellow in Biomedicine, is working on Cardiac Mechano-Electric Coupling at Imperial College London. More information of his work can be found on: <http://www.imperial.ac.uk/medicine/people/p.kohl/>
All welcome!



Dr. Peter Caravan,
Harvard Medical School

Keble Small Research Grants: Results

Keble's Small Research Grants are awarded on a competitive basis (up to £2,000 each) and are designed to help in the development of a new research area or complete an existing project. The grant must be for a specific project or collaborative endeavour. Here we report on the results of recent research undertaken by some of our Fellows.

Web Application for The Holinshed Project

Holinshed's *Chronicles of England, Scotland and Ireland* were first published in the reign of Elizabeth I, and were the crowning glory of Tudor historical writing. They are best known as a source mine for Shakespeare, but they provide a unique and invaluable view of contested identities within the British Isles at a time of rapid religious change. The Holinshed Project, supported in part by a Keble small grant, is an interdisciplinary research project, conducted by Dr. Ian Archer, Keble Fellow and Tutor in Modern History and Dr. Paulina Kewes and Dr. Felicity Heal, colleagues at Jesus College.

The project has already made available a parallel text electronic edition of the two versions published in 1577 and 1587, enabling the two texts to be compared with the click of a mouse. The Keble small grant has helped with the next stage, the development of a web application to add annotations to the online version. This tool has been successfully used by project member Dr. Henry Summerson on William Harrison's *Description of Britain*, an

extraordinary topographical survey incorporated into the *Chronicles*.

Dr. Archer and his colleagues have also just submitted to Oxford University Press a co-edited collection of forty essays on the *Chronicles*, which will be published later in 2012. More information on the project and the texts are freely available

<http://www.cems.ox.ac.uk/holinshed/index.shtml>



Marvell's manuscripts

Dr. Diane Purkiss, Keble Fellow and Faculty member in English, and Dr. Johanna Harris (University of Exeter) have successfully completed a pilot project to assess the potential for digitising the poetry manuscripts of Andrew Marvell held at the Bodleian Library. The project was financed with a Keble Small grant. Marvell was one of the greatest English lyric poets of the seventeenth century. International interest from Renaissance scholars at this stage has bolstered support for the next step which will be to develop a major funding application to create an online edition of Marvell's manuscripts, which are currently held in libraries all over the world.

Geoffrey Hill's Language in a monograph

Dr. Matthew Sperling, Keble Fellow by Special Election in Modern English Literature, has recently been the recipient of a Keble Small grant to enable the completion of his first monograph: *Geoffrey Hill's Language*. Over the last summer, he has carried out research at the Universities of Leeds and Tulsa (USA) where relevant and crucial archives for his

monograph are held. Geoffrey Hill, Keble Honorary Fellow and Professor of Poetry at Oxford University, is considered one of the most distinguished contemporary poets. Dr. Sperling describes his monograph on the language used by Hill "...as a case of study for poetry and criticism's relations to the history of linguistic thought in theology, philosophy and

philology/linguistics". This book, soon to be published, offers the first large-scale account of the nature and qualities of Hill's language and linguistic thought.

Dr. Sperling's work and interests in literary creativity and its social, historical and material context have relevance to the work of others in the Keble Creativity Cluster.

Earlier arrival of modern humans in Europe

Prof. Thomas Higham, Keble Fellow and Interim Director of the ASC, and Dr Katerina Douka, a former D.Phil graduate student at Keble have published separate papers in the prestigious science journal *Nature* on their findings of what is, up to now, the earliest remains of modern humans in Europe (42-45 thousand years old). They used state-of-the-art radiocarbon methods to determine the age of two fossils, one from Italy and the other from the UK. Identifying the date at which modern people entered Europe is important because scientists are interested in

their role in Neanderthal extinction and whether there was any interbreeding between the two groups. The new data increases the period of overlap during which two species occupied Europe to ~4000 years. Details about this work can be found in: Higham et al. (2011) The earliest evidence for anatomically modern humans in northwestern Europe. *Nature* 479, 521-524. Benazzi, Douka et al. (2011) Early dispersal of modern humans in Europe and implications for Neanderthal behaviour. *Nature* 479, 525-528.



Palaeolithic: baby tooth from the Cavallo site in Italy, dated 43-45 thousand years old.

Creativity Lecture Series 2012 Advanced Studies Centre (ASC) Keble College



Hilary Term 2012

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| 1. Prof. Susan Greenfield (University of Oxford)
"The Neuroscience of Creativity" | Friday 20 January (O'Reilly Lecture Theatre) |
| 2. Prof. Kevin Warwick (University of Reading)
"Creating Cyborgs" | Friday 27th January (O'Reilly Lecture Theatre) |
| 3. Prof. Robin Dunbar (University of Oxford)
"Why the Internet Wont Make You Any More Friends" | Friday 9th March (O'Reilly Lecture Theatre) |

Trinity Term 2012

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| 4. Prof. Eric F. Clarke (University of Oxford)
"Distributed creativity in musical performance" | Friday 27th April (O'Reilly Lecture Theatre) |
| 5. Prof. Susanne Kuechler (UCL)
"Making things that move (or not): The challenge of empathy in knowledge economies" | Friday 4th May (O'Reilly Lecture Theatre) |
| 6. Prof. Margaret Boden (University of Sussex)
"Creativity as a neuroscientific mystery" | Friday 18th May (Pusey Room) |

Lectures will commence at 5.00 pm, in the Keble College O'Reilly Lecture Theatre followed by a wine reception in the Newman Quad

Convener of the series:
Dr Lambros Malafouris

London Lecture IV

Building a Brand with Andy Street

The 4th London Lecture for Keble Old Members was held last November at Hogan Lovells in Holborn by Old Member (1982) and John Lewis's Managing Director, Andy Street. Entitled "Building a Brand", Mr. Street talked about the Partnership in which the company is founded, from its beginnings in the early twentieth century to today. The next London Lecture will be held on Thursday 1 March.

Creativity Lecture Series 2012

The second Creativity Lecture Series, organised by Keble Fellow in Creativity, Dr Lambros Malafouris, will take place in Hilary and Trinity Terms 2012. The Series will include six lectures by distinguished researchers covering a number of quite different aspects of the creativity process; from the mystery and neuroscience of creativity, through creating cyborgs and internet "friends", to the creativity found in musical performance. All are welcome.