UK and Republic of Ireland SIAM Section Annual Meeting

Held 7th January, 2005 in Cork.

This was the first annual meeting of the section held in the Republic of Ireland and coincided with the opening of Cork as European City of Culture. Despite the rain and wind there was an excellent turnout for the meeting at the University College Cork (UCC).

The first speaker was Neil O' Connell (Warwick) who gave an informative survey talk on random matrices. Starting with some applications of random matrices including telephone encryption he examined the distribution of eigenvalues of random (orthogonal and unitary) matrices. By analogy with electrostatics he explained why the eigenvalues are more regularly spaced than might be expected. An open puzzle is a phase transition in the distribution of eigenvalues of powers of unitary matrices. Finally it was explained how eigenvalues of random unitary matrices are closely related, in a statistical sense, to the zeros of the Riemann zeta function.

Niall O Murchadha (UCC) gave an entertaining talk on the degrees of freedom of the gravitational field as specified by the equations of General Relativity, an appropriate topic in the centenary year of 3 of Einstein's seminal publications. He made extensive use of the analogy with the Maxwell equations of the electromagnetic field to show the necessity of splitting the equations into constraint and evolution parts. His talk placed the research in historical context, and showed how it underlies current efforts in numerical relativity. A question regarding the well-posedness of the evolution equations provided further opportunity for the speaker to demonstrate his enthusiasm for this fascinating subject, and to highlight the difficulty of outstanding research challenges.

After lunch Ivan Graham (Bath) described efficient boundary element

methods (BEMs) for PDEs. Typical applications such as computing electrostatic capacitance and acoustic obstacle scattering were presented. This clear and interesting talk contrasted the BEM to a standard finite element or finite difference method and surveyed some recent results on complexity issues. Mathematical challenges were presented, such as those arising from the treatment of irregular boundaries. It was shown how, with an appropriate fast matrix vector multiplication method, the complexity of the BEM was competitive with that of a FEM. Recent research which extend the methods and analysis to degenerate meshes was summarised.

Russell Davies (Aberystwyth) gave an interesting talk on wobble, creep and relaxation where he is modelling materials with memory. He enthusiastically explained that what constitutes a fluid depends on the time scale of the observations : including sagging tombstones and mountains flowing. He talked on the corkscrew instability that arises in extrusion of plastics or similar visco-elastic flows. He then asked why a jelly wobbles. The answer, in terms of mathematics, was given as a Sturm-Liouville problem. An open question, of relevance to the industrial processing of all polymeric materials, is to determine the dominant rate of decay of the transient.

The final speaker, Alexei Pokrovskii (UCC), introduced equations with hysteresis nonlinearities. He used computer applets to illustrate the important rate-independent property of hysteresis, which cannot be easily described in terms of standard mathematical formulas. The Krasnoselskii program for investigating hysteresis was outlined, and stress was laid upon the Identification Theorem, which links many types of hysteresis behaviour to the Preisach operator. The lecture concluded with an overview of some recent results on the complicated behaviour of a pendulum subject to hysteresis, including a rigorous proof of the existence of chaos.

Business meeting : This was held after an excellent lunch.
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The UKIE section president, Martin Stynes, gave a brief overview of the
past year and reminded the members present that the posts of President
and Vice-President become vacant at the end of March 2005 and nominations for
were solicited. The secretary reported on finances and activities funded in
the year including the 5 student prizes presented. It was generally agreed
that these activities should be continued and if possible extended.

The meeting thanked Trevor Stuart and Andy Wathen for their hard work in
trying to arrange a joint meeting with the LMS, IMA, CMS and SIAM in the UK
which unfortunately fell through. It was agreed that there is still strong
interest in UKIE SIAM in holding SIAM Conferences either the UK or
Republic of Ireland. Andy Wathen noted that SIAM will be holding the 2005
SIAM Conference on Optimization in Stockholm and if that goes well further
meetings outside the US may occur. He also noted that the European
representatives on Board and Council were always willing to raise any points
members might have.

In answer to some specific points raised at the meeting.
*) The UKIE section is linked from
http://www.siam.org/sectchapt/sections.htm
*) The meeting appeared on
http://www.siam.org/meetings/calendar.htm

The next annual meeting will be in January 2006, preferably Jan 6,
venue to be decided.

James Gleeson and Gabriel Lord