PDE CDT & OxPDE Newsletter

November 2015

Volume 1, Issue 2

CDT Mini-Course

Some Results on Degenerate Partial Differential Equations

Prof. Hua Chen (Wuhan University, China)

Revised Times

9-11am Thursday, 12 Nov (C4)
9-11am Thursday, 19 Nov (L5)
and 2-4pm (L2)
9-11am Tuesday, 24 Nov (C5)

Please see below for a brief course description.

Contacts

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EPSRC Centre for Doctoral Training in Partial Differential Equations
Oxford Centre for Nonlinear Partial Differential Equations

This is a busy month for the CDT and OxPDE, with another CDT mini-course, as well as a very full schedule of seminars, lectures and departmental colloquia. Please note that there will be two specially scheduled seminars on Monday 16 November. Do check overleaf for the details.

We'd also like to extend our congratulations to Michaela and Sebastian Vollmer who had a baby girl on 13 October, Jana-Elin Katharina. Both baby and mother are doing well.

OxPDE Summer Research Projects for Undergraduates

Last summer OxPDE ran its undergraduate research project scheme for the seventh year. This programme gives undergraduates a taste of independent research in order to help them decide whether or not a PhD might be for them. Jamie Taylor, a fourth year DPhil student, was a joint supervisor for one such project. Jamie reflected on the experience saying:

> Over the summer I, with Angkana Rüland, spent seven weeks co-supervising Thomas Swayze from Carnegie Melon University in Pittsburgh in his undergraduate summer project, "Constrained problems in the calculus of variations". Through this I had the opportunity to develop my teaching skills in a more one-on-one environment than that of being a teaching assistant for an undergraduate class, which has also brought advantages to how I interact with my own supervisor.

The Met Office

Miles Caddick is entering his second year at the PDE CDT and was co-supervised by Prof Mike Cullen of the Met Office for his second CDT mini-project. He is looking to develop this project into the main element of his DPhil. Of the work, Miles tells us:

> My mini project looked at the well-posedness of equations which, under suitable assumptions, model the evolution of the Atmospheric Boundary Layer. The project was an interesting one as it allowed me to learn about areas of mathematics which were new to me, and it also gave me the chance to learn a small amount of meteorology. This mini project has lead on to the second year of the CDT, where I will continue the work under the joint supervision of Endre Süli and Mike Cullen. It is hoped that during the full DPhil project the validity of a model used by the Met Office will either be confirmed, or evidence will be given to suggest that a different parameterisation is required.

Overview of CDT mini-course "Some Results on Degenerate Elliptic Equations" Prof Hua Chen

This is an extension course (8 hours) on elliptic PDE for PhD students who have already covered the fundamentals of PDEs. The course will include some fundamental results on the degenerate elliptic equtions, i.e. hypoellipticity, Hörmander's sum of square theorem, Bony's maximum principle, the sub -elliptic estimate and sub-elliptic metric, the logarithmic regularity estimate and logarithmic Sobolev inequality, estimates of eigenvalues for finitely degenerate and infinitely degenerate elliptic operators, and the boundary-value problems for linear and nonlinear degenerate elliptic equations.

Current Visitors

Panu Lahti (Aalto) until 31 July 2016

Emanuel Indrei (Carnegie Mellon) until 12 December 2015

Bianca Stroffolini (Naples) until 22 December

Ken Abe (Kyoto) until 31 January 2016

and coming soon:

Hua Chen (Wuhan) 10 November to 9 December 2015

Duvan Henao (PUC de Chile) 21 November to 13 December 2015

Upcoming Events

Don't forget that the PDE seminars are at **4pm on Mondays** and the PDE CDT Lunchtime seminars are at **midday on Thursdays**. This month also sees a number of other lectures and colloquia that are closely related to PDEs, and which should be of interest to everyone in the group.

2 November **Antonio Ache** (Princeton University)

Sharp Trace-Sobolev inequalities of order 4

5 November **Tobias Barker** (Oxford)

Ancient Solutions to Navier-Stokes Equations in Half Space

9 November **Lars Diening** (University of Osnabrück)

Instance optimality for the maximum strategy

12 November **David Seifert** (Oxford)

Energy Decay in a 1-D coupled heat-wave system

16 November **Tony Carbery** (Edinburgh) (3pm)

Magnitudes of compact sets in euclidean spaces: an application of analysis to the theory of enriched categories

Laure Saint-Raymond (ENS) (4pm)

The Stokes-Fourier equations as scaling limit of the hard sphere dynamics

19 November **Amit Acharya** (Carnegie Mellon University)

Why gradient flows of some energies good for defect equilibria are not good for dynamics,, and an improvement

20 November **Felix Otto** (Max Planck Institute) MI Colloquia

Effective behaviour of random media: From an error analysis to elliptic regularity theory

23 November **Philip Bond** (Quantitative Software Consulting) gives the Alan Tayler Lecture at St Catherine's College: How Long is a Piece of Spacetime

26 November **Giacomo Canevari** (Oxford)

Defects in nematic liquid crystals: non-orientability and energy bounds

27 November **Sergiu Klainerman** (Princeton University) MI Colloquia

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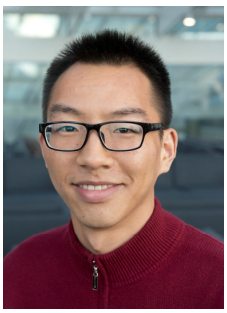
30 November **Andrew J. Majda** (Courant Institute, NYU) gives the 9th Brooke Benjamin Lecture: Applied Mathematics and Climate Science, Waves and Turbulence

A fond farewell to Xuxu Sun



I benefited a lot from my year of study in Oxford! All of the courses and seminars have been of great help to my academic career. The regular weekly meetings with Prof. John Ball made it clearer what I want to study and also helped me to find the topic for my further PhD research. The various aspects of the PDE CDT courses also broadened my horizons regarding the application of PDEs to other branches of science. The weekly OxPDE seminar kept us in touch with recent research frontiers and the exploration of new areas of mathematics. The beautiful new building provided me with an enjoyable and happy environment for study. The people here are very nice, and whenever I had any trouble they were all always glad to do their best to help me.

Oxford - I liked the beautiful parks and the river near my house, and enjoyed moments of running along the banks of the Thames and through Christ Church Meadow. I was so lucky to be here for a year of study and to meet so many kindly friends. I will miss everyone here and wish all of them the best. You are all welcome to visit me in China and I hope to see you again!