The Department of Mathematical Sciences
Colloquium

Professor Philip Maini

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University of Oxford, UK

Thursday, March 2, 2017
2 – 3 pm
Rm 140 WCharlton Hall

Modelling collective cell movement

Collective cell movement is ubiquitous in biology, occurring both in normal processes (for example, development, wound healing) and in disease (for example, cancer). In most of these examples, how cells coordinate their movement is still not well understood. We will consider two examples**:** (i) angiogenesis is the process by which new blood vessels are formed in response to, for example, wounding or tumour growth. Typically, this has been modelled phenomenologically using the well-known snail-trail framework, leading to a coupled system of nonlinear partial differential equations for two key endothelial cell populations (tips and sprouts). Here, we revisit this model and show that a more formal derivation of the PDE model, from a discrete master equation framework, leads to a novel, coupled system of PDEs to those studied in the literature**;** (ii) cells also move collectively as components of a sheet, typically in epithelial tissue. We analyze invasive behaviour in such systems and show how, in a very simple case, the computational model reduces to a novel nonlinear diffusion equation.

Refreshments will be served after the talk, 3:15 – 3:45 pm, in the Faculty & Graduate Student Lounge
Rm 4118 French Hall West

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