Potential Supervisors

Prof Patrick Farrell

I am an Associate Professor of Numerical Analysis and Scientific Computing and EPSRC Early Career Research Fellow in the Numerical Analysis group of the University of Oxford, and a Tutorial Fellow at Oriel College, Oxford. I work on the numerical solution of partial differential equations, with a particular focus on bifurcation analysis of nonlinear equations, the automated derivation and application of adjoint models, and the interaction between computational geometry and numerical simulation. I apply the numerical techniques I develop to various applications, including tidal turbines for renewable energy, bidomain cardiac electrophysiology, radiation transport, and glaciology.

I mainly code in Python, contribute regularly to the FEniCS and PETSc software projects, and lead the development of dolfin-adjoint.

Software Tools Developed

Dolfin-adjoint - The dolfin-adjoint project automatically derives the discrete adjoint and tangent linear models from a forward model written in the Python interface to DOLFIN. Dolfin-adjoint won the Wilkinson Prize for Numerical Software in 2015.

FEniCS - FEniCS is a popular open-source (LGPLv3) computing platform for solving partial differential equations (PDEs)

PETSc - is a suite of data structures and routines for the scalable (parallel) solution of scientific applications modelled by partial differential equations.

Involvement of DTC Students

Joanneke Jensen: *Inversion based on simultaneous observations of voltage and calcium concentration in human induced pluripotent stem cell-derived cardiomyocytes*

Industrial links

Current active projects*: Simula Research Laboratory, Embraer, London Computational Solutions, Petrotechnical Data Systems*

Previous projects: MeyGen, Tidal Generation Ltd, Fujitsu Laboratories, AMEC Foster Wheeler, Schlumberger, Babcock & Wilcox, OpenCFD