Christopher John Davies

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Mobile: (44) (0)7790842883 Date of birth: 15.08.1982

Education

2005–June 2009 University of Leeds, Leeds, UK

PhD in Geophysics
Thesis Title: Thermal core-mantle interactions
Supervisors: David Gubbins and Peter Jimack

2004–2005 University of Leeds, Leeds, UK

MSc in Computational Fluid Dynamics
Thesis Title: An Efficient Finite Element Method for Simulation of cardiac arrhythmia using the Fenton-Karma model
Supervisor: Matthew Hubbard

2001–2004 University of Leeds, Leeds, UK

BSc in Computer Science

Research Employment

06/09–12/09 University of Leeds, Leeds, UK

Postdoctoral Researcher

List of Publications

Peer-reviewed:

- Davies, C.J., Gubbins, D., Willis, A.P. and Jimack, P.K. (2008) Time-averaged paleomagnetic field and secular variation: predictions from dynamo solutions based on lower mantle seismic tomography, *Phys. Earth Planet. Inter*, 169, 194-203.
- Davies, C.J., Gubbins, D. and Jimack, P.K. (2009) Convection in a rapidly rotating spherical shell with an imposed laterally varying thermal boundary condition, *J. Fluid Mech.*, 641, 335–358.
- Davies, C.J., Gubbins, D., Jimack, P.K. Scalability of pseudospectral methods for geodynamo simulations, submitted for publication.

Media recognition of my work:

- Cover story in Journal of Fluid Mechanics, volume 641.

Other:

- Davies, C.J.: Thermal core–mantle interactions, PhD thesis, University of Leeds, Leeds, West Yorkshire, June 2009.

Presentations

- A computational framework for geodynamo models (poster), E-science all-hands meeting, Nottingham, UK, August 2006
- Geodynamo simulations and the paleosecular variation (oral), British Geophysical Association, Edinburgh, UK, September 2006
- Analysis of geodynamo solutions incorporating a laterally varying heat flux boundary condition (oral), Institut de Physique du Globe de Paris (IPGP), Paris, France, March 2007
- *Invited talk*: Convection in a rapidly rotating spherical shell with an imposed laterally varying thermal boundary condition, ETH Zurich, Zurich, Switzerland, January 2009
- New paleomagnetic predictions from dynamo models incorporating laterally varying thermal boundary conditions (oral), World University Network Meeting, University of Leeds, Leeds, UK, July 2009

Research experience

June 2009–present University of Leeds, Postdoctoral researcher

- Benchmarked and profiled a parallel numerical dynamo code
- Redesigned the parallel implementation of a parallel numerical dynamo code
- Derived a new buoyancy profile for Earth's core
- Compared the effects of different boundary conditions on a convecting fluid inhomogeneously heated from above

2005–June 2009 University of Leeds, PhD

- Developed scaling laws for numerical dynamo simulations in the asymptotic limit of large problem size
- Investigated the effects of laterally inhomogeneous thermal boundary conditions on rotating spherical fluid systems and elaborated on the mechanisms of locking and boundary-driven resonance.
- Analysed how geodynamo simulations incorporating laterally varying thermal boundary conditions generate almost steady magnetic fields
- Investigated the possible signature of core-mantle coupling in historical and paleomagnetic observations of the Earth's magnetic field using numerical geodynamo simulations
- Investigated the averaging time required to obtain a mean paleomagnetic direction
- Developed visualisation tools for postprocessing of geodynamo simulation data
- Developed tools for the synthesis and analysis of time-averaged and paleosecular variation data obtained from geodynamo calculations

2004–2005 University of Leeds, MSc

- Implemented adaptive timestepping algorithms and interpolation routines for the Fenton-Karma model of cardiac arrhythmia.
- Tested and verified a 2D Finite Element solver for the Fenton-Karma model of cardiac arrhythmia
- Applied numerical methods to compressible and incompressible flows in a variety of subject areas including plume models, combustible gases, and turbulence modelling

Teaching experience

2005–June 2009 Postgraduate demonstrator, University of Leeds

Mathematical methods for geophysicists (masters)
Computer programming (masters)
Inverse theory (final year undergraduate and masters)
Statistical analysis (1st year undergraduate)

I have also aided in the supervision of an undergraduate project.

Computational and IT skills

- *Languages*: extensive use of Fortran, C++, Java, Perl, and shell scripting.
- *Software*: extensive use of Matlab, IRIS Explorer and OpenDX for data postprocessing and visualisation.
- *Numerical methods*: extensive experience with the mathematics and computational implementation of Finite Element, Finite difference, Finite Volume, Boundary Element and spectral methods.
- Training and extensive exposure with CFD packages Fluent and CFX.
- *Parallel programming*: use of the Message Passing Interface (MPI).

References

Professor David Gubbins
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Professor Peter Jimack
School of Computing
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