CANDIDATE BRIEF

Research Fellow in Computational Methods in Fluid Mechanics and MHD, School of Mathematics

Salary: Grade 7 (£32,548 – £38,833 p.a.)
Reference: MAPMA1093
Closing date: 19 November 2018
Interviews to take place week commencing 26 November 2018
Fixed-term for three years (with the possibility of an additional two years)
We will consider job share/flexible working arrangements
Research Fellow in Computational Methods in Fluid Mechanics and MHD
School of Mathematics, Faculty of Mathematics and Physical Sciences

Are you an ambitious researcher looking for your next challenge? Do you have an established background in computational methods and/or fluid dynamics? Do you want to further your career in one of the UK’s leading research-intensive universities?

We are looking for a Research Fellow to join our project, working on performing Direct Statistical Simulation (DSS) of partial differential equations (PDEs) in multi-scale physics and fluid dynamics within the Dedalus framework. The project, which combines several new areas in statistics, PDEs and automated computational science, is funded by the award of a European Research Council Advanced Grant. You will work with Principal Investigator Professor Steven Tobias and his Co-Investigators to provide a flexible package to generate and solve systems of equations for the statistical properties of fluid flows in Cartesian, spherical and cylindrical geometries. The project will involve utilising Python's functionality to derive the relevant statistical equations and using the Dedalus machinery to solve accurately the resulting partial differential equations. As part of this, you will learn different mathematical and computational techniques, and apply them to diverse physical applications.

You will have a PhD in Applied Mathematics, Physics, Engineering or a closely allied discipline, with a strong background in Fluid Dynamics and experience in designing, implementing and analysing algorithms for fluid problems on parallel architectures. You will also have the ability to conduct independent research and a developing track record of publications in international journals. In addition, you will have excellent communication, planning and team working skills.

What does the role entail?

As a Research Fellow your main duties will include:

- Designing, planning and conducting a programme of investigation, in consultation with Professor Steve Tobias and the Co-Investigators;
• Generating independent and original research ideas and methods in Fluid Dynamics and magnetohydrodynamics with an aim to extend the Fluid Dynamics research portfolio;
• Enabling the automatic derivation and solution of statistical equations within the python Dedalus PDE solver framework;
• Helping to maintain the functionality of DSS within the Dedalus framework;
• Making a significant contribution to the dissemination of research results by publication in leading peer-reviewed journals, and by presentation at national and international meetings;
• Working independently and as part of a larger team of researchers, both internally and externally to develop new research links and collaborations and engage in knowledge transfer activities where appropriate;
• Contributing to the supervision of junior researchers and PhD students and acting as a mentor to less experienced colleagues;
• Evaluating methods and techniques used and results obtained by other researchers and relating such evaluations to your own research;
• Contributing to, and encouraging, a safe working environment.

These duties provide a framework for the role and should not be regarded as a definitive list. Other reasonable duties may be required consistent with the grade of the post.

What will you bring to the role?

As a Research Fellow you will have:
• A PhD in Applied Mathematics, Physics, Engineering, Computer Science or a closely allied discipline, with a strong background in programming;
• Experience in designing and implementing algorithms for solving partial differential equations on parallel architectures, and in analysing the output of such algorithms;
• The ability to design, execute and write up research independently;
• Excellent communication skills, both written and verbal, and the ability to communicate your research at national and international conferences;
• Good time management and planning skills, with the ability to meet tight deadlines;
• A proven ability to work well both independently and as part of a team;
• An ability to work accurately and carefully;
A strong commitment to your own continuous professional development.

You may also have:
- Experience in object-oriented programming;
- Experience in programming in Python;
- Experience in multi-scale modelling and/or model-reduction techniques for PDEs;
- Experience in spectral numerical methods;
- A background in Machine Learning, and/or computational optimisation;
- Experience in fluid dynamics;
- Experience in non-equilibrium statistical mechanics.

How to apply

You can apply for this role online; more guidance can be found on our How to Apply information. Applications should be submitted by 23.59 (UK time) on the advertised closing date.

Contact information

To explore the post further or for any queries you may have, please contact:

Professor Steven Tobias, Professor of Applied Mathematics
Tel: +44 (0)113 343 5172
Email: S.M.Tobias@leeds.ac.uk

Additional information

Project Co-Investigators
Professor Steven Tobias University of Leeds
Professor Brad Marston Brown University

The Dedalus Developer Team
Dr Geoff Vasil University of Sydney
Dr Jeff Oishi Bates College
Keaton Burns Center for Computational Astrophysics/Flatiron Institute
Working at Leeds
Find out more about the benefits of working at the University and what it is like to live and work in the Leeds area on our [Working at Leeds](#) information page.

A diverse workforce
The Faculty of Mathematics and Physical Sciences is proud to have been awarded the [Athena SWAN Bronze Award](#) from the Equality Challenge Unit, the national body that promotes equality in the higher education sector. Our [equality and inclusion webpage](#) provides more information.

Candidates with disabilities
Information for candidates with disabilities, impairments or health conditions, including requesting alternative formats, can be found on our [Accessibility](#) information page or by getting in touch with us at disclosure@leeds.ac.uk.

Criminal record information
Rehabilitation of Offenders Act 1974
A criminal record check is not required for this position. However, all applicants will be required to declare if they have any ‘unspent’ criminal offences, including those pending.

Any offer of appointment will be in accordance with our Criminal Records policy. You can find out more about required checks and declarations on our [Criminal Records](#) information page.