



## Research Fellow

<b>Position number</b>	TBA
<b>Department/Unit</b>	School of Mathematical Sciences
<b>Faculty/Division</b>	Faculty of Science
<b>Classification (<a href="#">SALARY RATES</a>)</b>	Level A
<b>Employment type</b>	Full-time
<b>Work location</b>	Clayton Campus
<b>Date document created or updated</b>	11 January 2016

### Position purpose

The Postdoctoral Research Fellow will undertake research on developing novel numerical methods and software for parallel simulation of compressible fluids on adaptive grids, as part of the ARC Discovery Project "Advanced Simulation Methods for the Coupled Solar Interior and Atmosphere". The project focuses on world-class numerical methods for complex MHD systems capable of handling many orders of magnitude variations in density and wave speed across the domain, sharp and dynamically evolving inhomogeneities, and spherical geometries.

Specific research topics of interest include parallel linear and nonlinear solvers for high-order accurate implicit time integration, and parallel adaptive grid refinement with error estimation. This will build on recently developed simulation technology that features fourth-order spatial accuracy on cubed-sphere grids, solution-adaptivity with dynamic refinement and coarsening, and implicit time integration methods that retain efficiency on thousands of compute cores.

The work will be conducted at Monash University under the supervision of Prof. Hans De Sterck, and will involve collaboration with Prof. Clinton Groth from University of Toronto. It is expected that the Research Fellow will carry out one or more month-long research visits to University of Toronto.

This is the first postdoctoral position (Position A) of two positions that are currently being advertised for this ARC Discovery Project. The second appointment will concentrate on the application of this MHD simulation code and other existing codes to modelling specific wave propagation problems of the solar atmosphere (Position B).

This position is Position A, and is for 2 years. No funding is currently available for an extension.

- **Reporting line:** The position reports to Prof Hans De Sterck.
- **Supervisory responsibilities:** Nil
- **Financial delegation and/or budget responsibilities:** Nil

## Organisational context

**Monash University** is an energetic and dynamic university committed to quality education, outstanding research and international engagement. A member of Australia's Group of Eight research intensive universities, it seeks to improve the human condition and is committed to a sustainable future. Monash has six campuses in Victoria, a campus in Malaysia, a campus in South Africa, a centre in Prato, Italy, and numerous international partnerships and cooperative ventures.

Monash has approximately 56,000 equivalent full-time students spread across its Australian and off-shore campuses, and approximately 7000 full time equivalent staff. Approximately 3500 of these staff members are academic staff.

The Faculty of Science contributes to the university's goals via research, teaching and partnerships with industry, government and individual supporters. Our five Schools cover a large and diverse range of disciplines in undergraduate and postgraduate courses. Ten Schools from other university faculties contribute to science teaching at all levels, allowing students to choose their studies from physical, biological, biomedical, behavioural, environmental, mathematical and computer sciences. The research in the Faculty of Science is carried out by world-class researchers. Their work spans the theoretical to the applied, contributes to new knowledge and technologies, and challenges how we interact with the world. To learn more about the Faculty of Science, please visit our website: [www.monash.edu/science/](http://www.monash.edu/science/)

The School of Mathematical Sciences is one of the largest of the six Schools in the Faculty, and has close working collaborations with other Schools/Departments such as Physics & Astronomy, Earth, Atmosphere and Environment, Computer Science; and other faculties such as Business and Economics, Arts, Medicine, IT and Engineering. The School has strong links with outside institutions such as CSIRO, the Defence Science and Technology Organisation, and the National Australia Bank and a large number of research institutes and universities around the world. The School of Mathematical Sciences has a leading research reputation in Applied and Computational Mathematics, with a recent hiring focus on scientific computing methods.

## Key result areas and responsibility

- The conduct of research under limited supervision either as a member of a team or, where appropriate, independently, and the production or contribution to the production of papers and publications from that research;
- Involvement in professional activities including, subject to availability of funds, attendance at conferences and seminars in the field of expertise. Some funds are available to support domestic and international research-related travel;
- Limited administrative functions primarily connected with the area of research of the academic;
- A minimal amount of teaching will be required, not more than one half of one unit per year;
- Attendance at meetings associated with research or the work of the organisational unit to which the research is connected and/or at departmental, school and/or faculty meetings and/or membership of a limited number of committees; and
- Advice within the field of the staff member's research to postgraduate students.

## Key selection criteria

### Essential

1. A PhD or equivalent degree in applied/computational mathematics, mechanical/aerospace engineering, or computational science, with specialization in one or more of numerical methods for PDEs (hyperbolic conservation laws), scalable solvers, or computational fluid dynamics (candidates who expect to submit their thesis within the first half of 2016 will be considered, but must describe in some detail the current state of their thesis);
2. Strong track record in research on numerical methods for PDEs, scalable solvers, or CFD, as evidenced by publications in leading journals or conferences in the field (published and/or submitted);
3. Proven experience with efficient computer implementation of numerical methods, preferentially in high-performance computing environments;
4. Excellent written communication and verbal communication skills with proven ability to produce high-quality scientific publications and presentations;
5. Proven ability to perform collaborative research.

### Other job-related information

Flexible working conditions, which may include:

- Travel (e.g to other campuses of the University)
- Shift work, overtime and out of hours work (including evenings, weekends and public holidays)
- Peak period of work during which the taking of leave may be restricted

### Legal compliance

Ensure you are aware of and adhere to legislation and University policy relevant to the duties undertaken, including:

- Equal Employment Opportunity, supporting equity and fairness
- Occupational Health and Safety, supporting a safe workplace
- Conflict of Interest (including Conflict of Interest in Research)
- Paid Outside Work
- Privacy
- Research Conduct
- Staff/Student Relationships