Paul Bartholomew

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I am a Post-Doctoral Research Associate (PDRA) at Imperial College London with six years' experience working with, and developing, Computational Fluid Dynamics software for research. In the course of this research I have developed extensive skills working with research software and programming in widely used scientific languages including `C`, `Fortran` and `Python` and a passion for developing scientific software.

Education

2013 – 2017 **PhD in Computational Fluid Dynamics**, *Department of Mechanical Engineering, Imperial College London*.
- Contributed to the development of a general-purpose CFD research code, implementing a fully-coupled solver for the two-fluid model.
  - Learned to write `C` and write software intended for parallel computing
- Published in international peer-reviewed journal
- Presented work at national and international conferences
- Contributed to teaching of MSc students as a Graduate Teaching Assistant for the CFD course

2009 – 2013 **MEng. (First class) in Mechanical Engineering**, *Imperial College London*.
- Achieved the 3rd year Dean's list

2007 – 2008 **Advanced Highers**, *AAA in Chemistry, Maths and Physics*.
- Senior Proxime Accessit, Bearsden Academy

2006 – 2007 **Highers**, *AAAA in Chemistry, Maths, Physics and Technical Studies; B in English*.

2004 – 2006 **Standard Grades**, *Grade 1 in Art, Chemistry, French, Geography, Maths, Physics and Technical Studies; grade 2 in English*.

Professional/research experience

2018 – 2019 **eCSE 13-03 *A high-order accurate solver for free-surface flows***, Imperial College London.
- Awarded additional funding to continue work of eCSE 10-02 to develop a free-surface solver
- Key contributor to project to modernise `Incompact3d` codebase
- Presented work at national and international conferences

2017 – 2018 **eCSE 10-02 *An adjoint solver for variable-density flows in the low Mach number limit***, Imperial College London.
- Implemented a low Mach number solver in open-source CFD code `Incompact3d`
  - Learned to write `Fortran`
  - Gained experience working with Tier-1/0 super computers
- Presented work at national conferences
- Published in international peer-reviewed journal

2012 **Undergraduate Research Opportunities Programme**, Imperial College London.
- Won funding to join a research group in the Thermofluids division of the Mechanical Engineering department at Imperial College for the summer between the third and final year of my undergraduate MEng. degree.
- Gained experience working with Paraview
- Developed simple CFD code in Python

2008 – 2009 **Year In Industry**, *BAE Systems*, Glasgow.
- Worked in the operations department at the Scotstoun shipyard
- Implemented a requisition tracking system to facilitate transfer of materials between projects
- Assisted in project management of the charity project to refit the Seagull barge

Publications

Include:

P. Bartholomew, S. Laizet, *A New Highly Scalable, High-Order Accurate Framework for Variable-Density Flows: Application to Non-Boussinesq Gravity Currents in Computer Physics Communications* , 2019.

P. Bartholomew, F. Denner, M. H. Abdol-Azis, A. Marquis, B. van Wachem, *Unified Formulation of the Momentum-Weighted Interpolation for Collocated Variable Arrangements in Journal of Computational Physics* , 2018.

Skills and interests

Technical knowledge.

- Very strong background in numerical software, particularly CFD, having worked with and extended two research codes each using different numerical methods
- Contributed to the development of new software
- Able to effectively troubleshoot problems
- Identify areas where improvements can be made, for example when I decided to collaborate with another PDRA to produce a post-processing library from scripts we had developed independently: encouraging code-reuse and is already contributing to the work of others in the research group

Computer programming and skills.

- Have successfully developed software in several of the major languages used in computational science including `C`, `Fortran` and `Python` and have experience using `MATLAB/Octave`
- Have experience programming for distributed systems and a good knowledge of `MPI` and the `PETSc` library
- Familiar with Linux use and administration
- Experience using tier-1/0 HPC systems

Communication skills.

- Strong presentation skills developed by presenting to both specialist and non-specialist audiences
- Ability to explain concepts clearly, honed by working as a Graduate Teaching Assistant during my PhD
- I have been able to combine these skills with my knowledge of software development practices to produce a short introduction to git to present to PhD students in the group
- Precise and clear writing skills developed by publishing work in peer-reviewed journals
- Combining these skills with software development has great potential for scientific software
  - Have applied this using literate programming to produce reports with integrated post-processing code that my supervisor was very pleased with and am exploring its use to develop a new module for our codebase

Teamwork and collaboration.

- I have worked as part of a team during both my PhD and PDRA working on a common software for research
- Experience working with source control management tools including git and svn

Personal interests.

- **Sports** Cycling, badminton and squash
- **Hobbies** Guitar

Referees

Dr. Sylvain Laizet, *Senior Lecturer*,
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