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Education PhD in Applied Mathematics **University of Alberta**, 2011  
• Supervisor: John C. Bowman

MSc in Applied Mathematics **University of Alberta**, 2006

BSc Honors Applied Mathematics **University of Alberta**

Work History Postdoctoral Researcher, **IRMA**, University of Strasbourg, France, since 2014.

- Member of the **TONUS** project for numerical simulation in Tokamaks.
- Developed a **OpenCL**/GPU-based Discontinuous Galerkin solver for numerical solution of the Vlasov equation.

Postdoctoral Researcher, **M2P2**, Aix-Marseille University, France, 2012 to 2014.

- Designed software for simulating magneto-hydrodynamic turbulence in a grid computing environment using spectral methods and penalisation.
- Aided in the supervision of PhD students.

Sessional Lecturer, **University of Alberta**, Canada, 2010.

- Lectured engineering differential equations.
- Design and deliver lectures and exams in a team-teaching environment.

Graduate Student, **University of Alberta**, Canada, 2003 to 2011.

- Develop a coherent research program.
- Write papers and present results at international conferences.
- Teach undergraduate math labs and help sessions.

English Teacher, South Korea, 2003 to 2004.

Summer Undergraduate Researcher, **University of Alberta**, Canada, 1998 to 2000.

- Submitted Articles Malcolm Roberts and John C. Bowman. “Implicitly Dealiased Convolutions on Shared Memory Architectures”. In: *SIAM Journal of Scientific Computing* (2016). Submitted. URL: <http://malcolmroberts.github.io/publications/dealias2.pdf>
- Malcolm Roberts et al. *SEME 2016: OptionWay Project Report*. 2016. URL: [http://malcolmroberts.github.io/publications/semi\\_optionway.pdf](http://malcolmroberts.github.io/publications/semi_optionway.pdf)
- Peer-Reviewed Articles Philippe Helluy et al. “Asynchronous OpenCL/MPI numerical simulations of conservation laws”. In: *Lecture Notes in Computational Science and Engineering* (2016). To appear. URL: <http://malcolmroberts.github.io/publications/sppexa2016.pdf>
- Sebastien Guisset et al. “Lagrangian/Eulerian Solvers and Simulations for Vlasov”. In: *ESAIM: Proceedings and Surveys* (2016). To appear. URL: <http://malcolmroberts.github.io/publications/lessive-cemracs2014.pdf>
- John C Bowman and Malcolm Roberts. “Adaptive Matrix Transpose Algorithms for Distributed Multicore Processors”. In: *Interdisciplinary Topics in Applied Mathematics, Modeling and Computational Science*. Springer, 2015, pp. 97–103. URL: <http://malcolmroberts.github.io/publications/transpose0.pdf>
- Malcolm Roberts et al. “Self-organization of helically forced MHD flow in confined cylindrical geometries”. In: *Fluid Dynamics Research* 46.6 (2014), p. 061422. URL: <http://stacks.iop.org/1873-7005/46/i=6/a=061422>
- John C. Bowman and Malcolm Roberts. “Pseudospectral Reduction of Incompressible Two-Dimensional Turbulence”. In: *Communications in Nonlinear Science and Numerical Simulation* 17.5 (2012), pp. 2008–2013. URL: <http://malcolmroberts.github.io/publications/psr.pdf>
- John C. Bowman and Malcolm Roberts. “Efficient Dealiased Convolutions without Padding”. In: *SIAM J. Sci. Comput.* 33.1 (2011), pp. 386–406. URL: <http://malcolmroberts.github.io/publications/dealias.pdf>

- Malcolm Roberts and John C. Bowman. “Dealiased convolutions for pseudospectral simulations”. In: *Journal of Physics: Conference Series* 318.7 (2011), p. 072037. URL: <http://stacks.iop.org/1742-6596/318/i=7/a=072037>
- J. C. Bowman et al. “Links between dissipation, intermittency, and helicity in the GOY model revisited”. In: *Physica D* 218 (2006), pp. 1–10. URL: <http://malcolmroberts.github.io/publications/smallscales.pdf>
- Dissertations    Malcolm Roberts. “Multispectral Reduction of Two-Dimensional Turbulence”. PhD thesis. Edmonton, AB, Canada: University of Alberta, 2011. URL: [http://malcolmroberts.github.io/publications/roberts\\_phd.pdf](http://malcolmroberts.github.io/publications/roberts_phd.pdf)
- Malcolm Ian William Roberts. “A Multi-Spectral Decimation Scheme for Turbulence Simulations”. MA thesis. University of Alberta, 2006. URL: [http://malcolmroberts.github.io/publications/roberts\\_msc.pdf](http://malcolmroberts.github.io/publications/roberts_msc.pdf)
- Conference Proceedings    Malcolm Roberts. *Report on the Math-Stat Graduate Education Round table*. 2011. URL: <http://malcolmroberts.github.io/publications/report10w2062.pdf>
- Malcolm Roberts, John C Bowman, and Bruno Eckhardt. “The Multispectral Method: Progress and Prospects”. In: *Advances in Turbulence XII*. Springer, 2009, pp. 791–794. URL: <http://malcolmroberts.github.io/publications/etc12articleroberts.pdf>
- Sean Bohun et al. *General Statistical Design of an Experimental Problem for Harmonics*. 2008. URL: <http://malcolmroberts.github.io/publications/etc12articleroberts.pdf>
- Software    John C. Bowman and Malcolm Roberts. *FFTW++: A fast Fourier transform C++ header class for the FFTW3 library*. [fftwpp.sourceforge.net](https://github.com/fftwpp). 2010-2016
- Malcolm Roberts. *clFFT++: A fast Fourier transform C++ header class for the clFFT library*. [github.com/dealias/clfftpp](https://github.com/dealias/clfftpp). 2016

- Malcolm Roberts, Philippe Helluy, and Emmanuel Franck. *schnaps: Solver for Conservative Hyperbolic Non-linear systems Applied to PlasmaS*. [schnaps.gforge.inria.fr/](https://github.com/malcolmroberts/schnaps). 2015-2016
- Thomas Engels, Malcolm roberts, and Dmitry Kolomenskiy. *FLUSI: Fluid-Structure-Interaction / MHD Research Code*. [github.com/pseudospectators/FLUSI](https://github.com/pseudospectators/FLUSI). 2015-2016
- Other Publications    Malcolm Roberts and Samantha Marion. *Notes for Differential Equations*. 2015. URL: <https://github.com/malcolmroberts/denotes>
- Selected Talks        *Self-organisation of helically forced MHD flow in confined cylindrical geometries*, Instabilities and Transport in Magnetized Plasmas, Geophysical and Astrophysical Flows, Institute for Advanced Study of Aix-Marseille University, 2014
- Helices in MHD Flow: Numerical Results from Penalized Pseudospectral Simulations*, Seminaire Equations aux derivees partielles, Strasbourg University, France, 2014
- Pseudospectral Simulations in Complex Geometry via Penalisation*, Journee Calcul scientifique performant en mecanique de la Federation Nicolas-Claude Fabri de Peiresc, Aix-Marseille University, France, 2013
- Implicitly Dealiased Convolutions for DNS: Preliminary MPI results*, Euromech 542, Lyon, 2013
- Convolutions for HPC*, CEMRACS 12, Marseille, 2012
- Dice, Dice, Dice*, LogiCON, 2012
- Mathtastic!*, Skeptically Speaking, 2012
- Turbulence, Fine and Coarse*, Condensed Matter Physics Seminar, University of Alberta, 2011
- The Pseudospectral Method: Recent Advances and Prospects*, Kavli Institute for Theoretical Physics, The Nature of Turbulence Workshop, UCSB, 2011
- Dealiasing Convolutions for Pseudo-Spectral Simulations*, Computational Plasma Physics Research Group Seminar, Ruhr Universität Bochum, Germany, 2011

*Teaching Collaboration on Hot Topics and Outcomes for Graduate Students*, PIMS Math and Stat Graduate Education Round Table, BIRS, 2010.

*The Multispectral Turbulence Decimation Method*, Politecnico di Torino, Italy, 2009

*The Multi-Spectral Method*, 6<sup>th</sup> International Congress on Industrial and Applied Mathematics, Switzerland, 2007

*General Statistical Design of an Experimental Problem for Harmonics*, Eighth PIMS-MITACS Industrial Problem Solving Workshop, 2004

## Teaching

Lecturer, University of Alberta, 2010

- Lectured differential equations for engineers.
- Administered homework and exams.
- High student evaluations and outcomes.

Teaching Assistant, University of Alberta, 2004 to 2010

- Ran undergraduate help sessions covering a wide range of topics.
- Graded homework and exams.
- Lab instructor
  - Designed and delivered lectures and quizzes.
  - Excellent evaluation from students.
  - Instructor for 38 labs constituting more than 1000 students.

Private Tutor in Mathematics, 2004-2010

- English as a Second Language Instructor, South Korea, 2003 to 2004

## Service

Thousand Faces Performance Art Festival

- President of the Board 2011 to 2013

PIMS Mathematical and Statistical Graduate Education Round table

- Brought together faculty, students, and administration from seven universities, resulting in new policies and programs being implemented.

Canadian Young Researchers Conference in Mathematics and Statistics

- Organizing Committee (2006, 2008, 2010)

Volunteer Mechanic/Instructor, Edmonton Bicycle Commuter's Association, 2009 to 2013, Collectif Vélos en Ville, 2012 to 2013  
University of Alberta Mathematics and Statistics Grad Association

- President 2005 to 2006, Treasurer 2006 to 2007

University of Alberta Math Fair and Math Outreach, 2004 to 2011

## Skills

Technical skills:

- Programming languages: C/C++, OpenCL, Python, R, and FORTRAN.
- Parallelism: OpenMP, MPI, and OpenCL (for GPUs).
- Linux, Windows, and Mac operating systems.
- Asymptote, L<sup>A</sup>T<sub>E</sub>X, ParaView, HDF5, gmsh.
- Version control: git, Mercurial, svn.

Project management and public speaking.

Native English speaker, advanced French, intermediate German.