Dr. Malcolm Roberts — Curriculum Vitae

Contact Information
malcolmiwroberts@gmail.com
malcolmiwroberts.com

Education

PhD in Applied Mathematics **University of Alberta**, 2011
- Supservisor: 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: *Submitted to the SIAM Journal of Scientific Computing* (2016)

Malcolm Roberts et al. *SEME 2016: OptionWay Project Report*. 2016

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.

Sebastien Guisset et al. "Lagrangian/Eulerian Solvers and Simulations for Vlasov". In: *ESAIM: Proceedings and Surveys* (2016). To appear.

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

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: 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

John C. Bowman and Malcolm Roberts. "Efficient Dealiased Convolutions without Padding". In: *SIAM J. Sci. Comput.* 33.1 (2011), pp. 386–406

Malcolm Roberts and John C. Bowman. "Dealiased convolutions for pseudospectral simulations". In: *Journal of Physics: Conference Series* 318.7 (2011), p. 072037. URL: 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

Dissertations

Malcolm Roberts. "Multispectral Reduction of Two-Dimensional Turbulence". PhD thesis. Edmonton, AB, Canada: University of Alberta, 2011

Malcolm Ian William Roberts. "A Multi-Spectral Decimation Scheme for Turbulence Simulations". MA thesis. University of Alberta, 2006

Conference Proceedings

Malcolm Roberts. *Report on the Math-Stat Graduate Education Round table*. 2011

Malcolm Roberts, John C Bowman, and Bruno Eckhardt. "The Multispectral Method: Progress and Prospects". In: *Advances in Turbulence XII*. Springer, 2009, pp. 791–794

Sean Bohun et al. *General Statistical Design of an Experimental Problem for Harmonics*. 2008

Software

John C. Bowman and Malcolm Roberts. `FFTW++`: *A fast Fourier transform* C^{++} *header class for the* `FFTW3` *library*. `fftwpp.sourceforge.net`. 2010-2016

Malcolm Roberts. `clFFT++`: *A fast Fourier transform* C^{++} *header class for the* `clFFT` *library*. `github.com/dealias/clfftpp`. 2016

Malcolm Roberts, Philippe Helluy, and Emmanuel Franck. `schnaps`: *Solver for Conservative Hypebolic Non-linear systems Applied to PlasmaS*. `schnaps.gforge.inria.fr/`. 2015-2016

Thomas Engels, Malcolm roberts, and Dmitry Kolomenskiy. `FLUSI`: *Fluid-Structure-Interaction / MHD Research Code*. `github.com/pseudospectators/FLUSI`. 2015-2016

Other Publications

Malcolm Roberts and Samantha Marion. *Notes for Differential Equations*. `github.com/malcolmroberts/denotes`. 2015

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^{th} 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, LaTeX, `ParaView`, `HDF5`, `gmsh`.
- Version control: `git`, `Mercurial`, `svn`.

Project management and public speaking.
Native English speaker, advanced French, intermediate German.