Matthew W. Emmett
Department of Mathematics
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Academics

Postdoc 2010–present
University of North Carolina, Chapel Hill NC.
Parallel in time methods for PDEs, low-mach number projection methods. Supervisor: **Dr. M. L. Minion**; collaborations with **Dr. J. Bell** *et al* at the Lawrence Berkeley National Laboratory.

PhD 2005–2010
University of Alberta, Edmonton AB.
Applied Mathematics. Fluid mechanics (shallow-water sediment transport) and numerical analysis (WENO methods). Supervisor: **Dr. T. B. Moodie**.

MSc 2003–2005
University of Calgary, Calgary AB.
Applied Mathematics. Differentiable manifolds and Hamiltonian mechanics (non-holonomic reduction). Supervisor: **Dr. Jędrzej Śniatycki**; co-supervisor: **Dr. Marcelo Epstein**.

BSc 1996–2001
Simon Fraser University, Burnaby BC.
Mathematical Physics with First Class Honours.

Publications

Dec 2011 — D. I. Ketcheson, K. T. Mandli, A. Ahmadia, A. Alghamdi, M. Quezada, M. Parsani, M. Knepley, M. Emmett; *An Accessible Extensible Parallel Wave Propagation Solver for General Hyperbolic PDEs*; Submitted to the SIAM Journal on Scientific Computing.

Dec 2011 — M. Emmett and M.L. Minion; *Toward an efficient parallel in time method for partial differential equations*; Submitted to Communications in Applied Mathematics and Computational Science.

Sept 2010 — M. Emmett; *Dam-break flows as agents of sediment transport*; PhD thesis.

Sep 2009 — M. Emmett and T.B. Moodie; *Sediment transport via dam-break flows over sloping erodible beds*; Studies in Applied Mathematics vol. 123 no. 3 pp. 257-290.

Jun 2009 — M. Emmett and T.B. Moodie; *Sediment transport via dam-break flows over sloping erodible beds*; Presented at, and published in the proceedings of, the Multiphase Fluid Flow 2009 conference, hosted by the Wessex Institute of Technology, New Forest, UK.

Aug 2008 — M. Emmett and T.B. Moodie; *Dam-break flows with resistance as agents of sediment transport*; Physics of Fluids vol. 20 no. 8 pp. 086603; `http://link.aip.org/link/?PHF/20/086603/1`.

May 2006 — O. Artoun, D. David-Rus, M. Emmett, L. Fishman, S. Fital, C. Hogan, J. Lim, E. Lushi, and V. Marinov; *Seismic Imaging, One-Way Wave Equations, Pseudodifferential Operators, Path Integrals, and all that Jazz*; Mathematical Modeling of Wave Phenomena: 2nd Conference on Mathematical Modeling of Wave Phenomena; AIP vol. 834 no. 1 pp. 286-295; `http://link.aip.org/link/?APC/834/286/1`.

Aug 2005 — M. Emmett; *Mechanics of a pseudo-rigid disc rolling in a plane on a line*; MSc thesis.

Research interests

Numerical Analysis	Parallel in time methods for PDEs. Spectral Deferred Correction integration schemes. High-order finite volume and projection methods. Weighted Essentially Non-Oscillatory schemes for hyperbolic systems.
Fluid Mechanics	Fluid dynamics, geophysical and environmental flows, gravity currents and sediment transport, free boundary flows and surface tension, turbulence, and applications in biology.
Partial Differential Equations	Systems of hyperbolic conservation and balance laws, perturbation theory, Sobolev spaces, and weak solutions.
Non-linear Dynamics and Chaos	Fixed point stability, bifurcations, and simple examples of the onset of chaos.
Differentiable Manifolds	Hamiltonian mechanics, Lie groups, holonomic and non-holonomic reduction of constraints.

Seminars and presentations (selected)

July 2011 Parallelizing higher-order projection methods in space and time. *International Congress of Applied and Industrial Mathematics, Vancouver BC.*

Sep 2010 WENO methods for sediment transport via dam-break flows. *Applied Math seminar, University of North Carolina, Chapel Hill NC.*

Jul 2010 Shallow-water waves and bed ripples due to erosion (poster). *Fluid dynamics, Analysis, and Numerics 2010, Duke University, Durham NC.*

Jun 2010 WENO methods for sediment transport via dam-break flows. *Wave Phenomena IV, U. of Alberta.*

Feb 2010 Dam-break flows, sediment transport and WENO methods. *Physical Mathematics Seminar, Massachusetts Institute of Technology, Boston MA.*

Jun 2009 Sediment transport via dam-break flows over sloping erodible beds. *Multiphase Fluid Flow 2009, Wessex Institute of Technology, New Forest, UK.*

Oct 2008 Sediment transport via dam-break flows over sloping erodible beds. *Graduate Research Symposium of the Institute of Geophysical Research, U. of Alberta.*

Mar 2008 Dam-break flows with resistance as agents of sediment transport. *Graduate Colloquium, U. of Alberta.*

Apr 2007 Hyperbolic conservation laws and finite volume methods. *Canadian Young Researchers Conference, U. of Calgary.*

Feb 2006 The logistic map as a simple example of chaos. *GAME Seminar, U. of Alberta.*

Apr 2005 The strange attractor of the Hénon map. *Young Researchers Conference, U. of Calgary.*

Jan 2005 Hamiltonian mechanics and the Hopf fibration. *Applied Math Seminar, U. of Calgary.*

Teaching experience

Fall 2011 **Instructor**, *Dept. of Mathemathics, U. of North Carolina, Chapel Hill NC.*
Differential equations and linear algebra (M383). Upper level undergraduate class; class size of 35 students.

Winter 2008 **Instructor**, *Dept. of Math and Stats, U. of Alberta, Edmonton AB.*
Calculus II (M101). Class size roughly 80 students.

Fall 2007 **Instructor**, *Dept. of Math and Stats, U. of Alberta, Edmonton AB.*
Calculus I (M100). Class size roughly 90 students.

Fall 2006 **Instructor**, *Dept. of Math and Stats, U. of Alberta, Edmonton AB.*
Calculus II (M101). Class size roughly 90 students.

2005–2010 **Teaching Assistant**, *Dept. of Math and Stats, U. of Alberta, Edmonton AB.*
Calculus I, II, and III (M113, M100, M101, M209). Differential Equations I (M201). Help sessions. Class sizes roughly 30 students.

2003–2005 **Teaching Assistant**, *Dept. of Math and Stats, U. of Calgary, Calgary AB.*
Calculus I, II, and III (M249, M251, M253, M349); Linear Algebra I (M211, M221); Introduction to Fourier Analysis (M415); Continuous tutorials. Class sizes ranging from 10 to 100 students.

Scholarships and awards

Sep 2009 Queen Elizabeth II Scholarship, *U. of Alberta.*

Feb 2008 Graduate Student Teaching Award, *U. of Alberta.*

Feb 2008 Teaching Excellence Award, *Delta Chi student group, U. of Alberta.*

Jul 2006 Josephine Mitchell Graduate Scholarship, *U. of Alberta.*

Sep 2005 Provost Doctoral Entrance Scholarship, *U. of Alberta.*

Conferences and workshops attended

Jul 2011	International Congress of Applied and Industrial Mathematics. *Vancouver BC.*
Mar 2011	High Performance Computing and Hybrid Programming Concepts for Hyperbolic PDE Codes. *King Abdullah University of Science and Technology, SA.*
Jul 2010	Fluid dynamics, Analysis, and Numerics 2010. *Duke University, Durham NC.*
Jun 2010	Waves Phenomena IV. *University of Alberta, Edmonton AB.*
Jun 2009	Multiphase Fluid Flow 2009. *Wessex Institute of Technology, New Forest UK.*
Jun 2008	Second Canada-France Congress. *U. du Québec à Montréal, Montréal QC.*
Jun 2007	Graduate Industrial Mathematical Modelling Camp, and Industrial Problem Solving Workshop. *U. of Alberta, Edmonton AB.*
Mar 2007	Complex Geophysical Gravity Currents Workshop. *U. of British Columbia, Vancouver BC.*
Jan 2006	Applied Mathematics Graduate Student Conference. *Simon Fraser University, Burnaby BC.*
May 2006	Graduate Industrial Mathematical Modelling Camp, and Industrial Problem Solving Workshop. *U. of Calgary, Calgary AB.*
Jun 2004	MRI Spring School: Lie groups in Analysis, Geometry and Mechanics. *U. of Utretch, Utretch North-Holland, Netherlands.*
2004-2008	Annual Canadian Young Researchers Conferences. *U. of Alberta and U. of Calgary, Edmonton AB and Calgary AB.*

Professional work experience (selected)

2002–present	**System Administrator**, *The Communitas Group, Edmonton AB.* File, mail, web and firewall server installation and maintenance.
2001–2003	**Programmer**, *Matrix Geoservices, Calgary AB.* Developed an anisotropic velocity analysis tool – a graphical data analysis tool to assist geophysicists in building anisotropic velocity models of the earth's surface.
2001–2006	**Programmer and System Administrator**, *Cooperative Auto Network (CAN), Vancouver BC.* Co-developed an on-line booking system for CANs network of shared cars. Ongoing maintenance of computing infrastructure.

Organising experience (selected)

2006–2010	**Organiser**: *Canadian Young Researchers Conference, Edmonton AB.*
2006–2009	**Secretary**: *Allendale Community League, Edmonton AB.*
2005–2009	**Secretary**: *Graduates at Alberta Mathematics Etc, Edmonton AB.*
2002–2006	**Various Committees, Committee Chair**: *Prairie Sky Cohousing Cooperative, Calgary AB.*
2003–2005	**Board of Directors**: *Calgary Community Network Association, Calgary AB.*
2002–2005	**President**: *Fair Vote Canada - Calgary Chapter, Calgary AB.*
2001–2004	**Board of Directors**: *Boiled Frog Trading Cooperative, Calgary AB.*