Matthew W. Emmett
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Academics

Postdoc 2012–present	*Center for Computational Sciences and Engineering, Lawrence Berkeley National Laboratory, Berkeley CA.* Spectral Deferred Correction and Adaptive Mesh Refinement methods for PDEs. Supervisor: **Dr. J. Bell**.
Postdoc 2010–2012	*University of North Carolina, Chapel Hill NC.* Parallel in time methods for PDEs, low-mach number projection methods. Supervisor: **Dr. M. L. Minion**.
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.

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. Adaptive Mesh Refinement.
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.

Publications

Oct 2012 R. Speck, D. Ruprecht, R. Krause, M. Emmett, M.Minion, M. Winkel, and P. Gibbon.; *Integrating and N-body problem with SDC and PFASST*; In preparation for DD21.

Oct 2012 M. Emmett and M.Minion; *Efficient implementation of a multi-level parallel in time algorithm.*; In preparation for DD21.

Sep 2012 M. Emmett and A. Dawson; *A guide to efficient integration schemes for integral projection models (IPMs)*; Submitted to Methods in Ecology and Evolution, Sep 2012.

Aug 2012 R. Speck, D. Ruprecht, R. Krause, M. Emmett, M.Minion, M. Winkel, and P. Gibbon.; *A massively space-time parallel N-body solver*; Accepted for presentation and publication at SC12.

Aug 2012 M. Emmett and T.B. Moodie; *Formation of bed ripples in critical Froude number dam-break flows*; Submitted to Physics of Fluids, August 2012.

Aug 2012 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*; SIAM Journal on Scientific Computing, vol. 34(4), pp. 210–231.

Mar 2012 M. Emmett and M.L. Minion; *Toward an efficient parallel in time method for partial differential equations*; Communications in Applied Mathematics and Computational Science, vol. 7 (2012), no. 1, pp. 105–132.

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.

Seminars and presentations (selected)

Feb 2012	Toward efficient parallel in time methods for PDEs. *SIAM Conference on Parallel Processing for Scientific Computing 2012, Savannah GA.*
Feb 2012	The Parallel Full Approximation Scheme in Space and Time (PFASST) algorithm. *High Performance Computing and Hybrid Programming Concepts for Hyperbolic PDE Codes, King Abdullah University of Science and Technology, SA.*
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.

Conferences and workshops attended (selected)

Feb 2012	High Performance Computing and Hybrid Programming Concepts for Hyperbolic PDE Codes. *King Abdullah University of Science and Technology, SA.*
Feb 2012	SIAM Conference on Parallel Processing for Scientific Computing 2012. *Savannah GA.*
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.*