

BARTOSZ PROTAS

Associate Professor of Mathematics
 Department of Mathematics & Statistics, McMaster University
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Education:

- Ph.D. in Mechanics, Warsaw University of Technology, Poland (with honors)
 and in Fluid Dynamics, Université Pierre et Marie Curie – PARIS VI, France
 (la mention *très honorable avec félicitations*), June 2000 (degree awarded jointly by the two Universities)
- M.Sc. in Mechanical Engineering, Warsaw University of Technology (with honors), July 1995;
 (major in Computational Fluid Dynamics)

Professional Experience:

- 07/2009 – present — Associate Professor of Mathematics, McMaster University
- 08/2003 – 06/2009 — Assistant Professor of Mathematics, McMaster University
- 11/2000 – 08/2003 — Post-Doctoral Researcher, University of California, San Diego
- 09/1997 – 10/2000 — Ph.D. student at the Warsaw University of Technology
 and Université Pierre et Marie Curie, Paris
- 03/1996 – 08/1997 — Research and Teaching Assistant at the Warsaw University of Technology

Primary Research Interests:

- Theoretical and Computational Fluid Dynamics
- Scientific Computing & Industrial Mathematics
- Control and Estimation Theory
- Numerical Optimization

Honours & Awards:

- Visiting Professorship at Université Bordeaux I (France), 2009 (1 month)
- Early Researcher Award (ERA), 2008
- Visiting Position with the “Bridging the Gaps” program at the University of Sheffield, UK, 2007 (3 weeks)
- Visiting Professorship at Université Pierre et Marie Curie – PARIS VI (France), 2006 (1 month)
- Visiting Professorship at École Supérieure de Physique et de Chimie Industrielles in Paris (France), 2005 (1 month)
- Visiting Professorship at École Normale Supérieure in Paris (France), 2003–2004 (6 months)
- SHARCNET Chair in Scientific Computation, 2003–2005
- Polish Society for Theoretical and Applied Mechanics Award, 1998
- Foundation for Polish Science Fellowship, 1998

Post–doctoral and Graduate Supervision:

- Dr. Agegnehu Atena (post–doctoral fellow, 2010–present)
- Dr. Ramesh Yapalparvi (post–doctoral fellow, 2009–present)
- Dr. Oleg Volkov (post–doctoral fellow, 2007–2009);
currently Visiting Professor at St. Francis Xavier University)
- Dr. Wenyuan Liao (post–doctoral fellow, 2005–2007;
currently Assistant Professor of Mathematics at the University of Calgary)
- Uladislau Buktynau (Ph.D. student 2008–present)
- Jonathan Gustafsson (Ph.D. student 2007–present, M.Sc. student 2006–2007)
- Diego Ayala (M.Sc. student, 2008–present)
- Xiaohui Peng (M.Sc. student, 2009–present)
- Xiaohui Li (M.Sc. student, 2006; transferred to the coursework program)
- Md. Shah Noor (M.Sc. student, 2004–2005)

Research Funding:

COUNCIL / AGENCY	ROLE	AMOUNT	TIME
NSERC — Discovery	PI	\$12,000 (pa)	2004 — 2009
General Motors of Canada	PI	\$20,000 (pa)	2005 — 2006
NSERC — Collaborative Research & Development	PI	\$30,000 (pa)	2005 — 2006
McMaster Centre for Advanced Material & Manufacturing	PI	\$16,000 (pa)	2005 — 2006
NSERC — Research Tools & Instruments	Co-PI	\$149,288 (total)	2006
General Motors of Canada	PI	\$28,000 (pa)	2007 — 2009
NSERC — Collaborative Research & Development	PI	\$30,050 (pa)	2007 — 2009
Ontario Centres of Excellence	PI	\$31,050 (pa)	2007 — 2009
SHARCNET Graduate Fellowship	PI	\$13,000 (pa)	2008 — 2009
Early Researcher Award	PI	\$150,000 (total)	2008 — 2013
Going Global Fund	PI	\$9,835 (total)	2008 — 2009
NSERC — Discovery	PI	\$16,000 (pa)	2009 — 2014
AUTO21	PI	\$16,000 (pa)	2009 — 2010

Membership:

- American Physical Society
- Society for Industrial and Applied Mathematics
- Canadian Applied and Industrial Mathematics Society

Recent Collaborators:

- Alan Elcrat (Wichita State University, Wichita, KS, USA)
- Charles Doering (University of Michigan, MI, USA)
- Angello Iollo (Université de Bordeaux, France)
- Nicholas K.-R. Kevlahan (McMaster University, Canada)
- Tony Murphy (CSIRO, Australia)
- Koji Ohkitani (University of Sheffield, UK)

Journal Articles — Review Papers

1. B. Protas, “Vortex Dynamics Models in Flow Control Problems”, *Nonlinearity* **21**, R203–R250 (invited paper), 2008.

Journal Articles — Research Papers

2. M. Farazmand, N. K. R. Kevlahan, B. Protas, “Controlling the dual cascade of two-dimensional turbulence”, *Journal of Fluid Mechanics*, accepted for publication, (2010).
3. J. Gustafsson and B. Protas, “Regularization of the Backward-in-Time Kuramoto–Sivashinsky Equation”, *Journal of Computational and Applied Mathematics* **234**, 398–406, (2010).
4. F. Gallizio, A. Iollo, B. Protas, L. Zannetti, “On Continuation of Inviscid Vortex Patches”, *Physica D* **239**, 190–201, (2010).
5. O. Volkov, B. Protas, W. Liao and D. Glander “Adjoint-Based Optimization of Thermo-Fluid Phenomena in Welding Processes” *Journal of Engineering Mathematics*, **65**, 201–220, 2009.
6. O. Volkov and B. Protas, “An inverse model for a free-boundary problem with a contact line: steady case”, *Journal of Computational Physics* **228**, 4893–4910, 2009.
7. B. Protas “Adjoint-Based Optimization of PDE Systems with Alternative Gradients” *Journal of Computational Physics* **227**, 6490–6510, 2008.
8. B. Protas and W. Liao “Adjoint-Based Optimization of PDEs in Moving Domains” *Journal of Computational Physics* **227**, 2707–2723, 2008.
9. B. Protas, “On an Attempt to Simplify the Quartapelle–Napolitano Approach to Computation of Hydrodynamic Forces in Open Flows”, *Journal of Fluids and Structures* **23**, 1207–1214, 2007.
10. B. Protas, “Center Manifold Analysis of a Point-Vortex Model of Vortex Shedding with Control”, *Physica D* **228** (2), 179–187, 2007.
11. B. Protas, “Higher-order Föppl models of steady wake flows”, *Physics of Fluids* **18**(11), 117109, 2006.
12. B. Protas, “Linear Feedback Stabilization of Laminar Vortex Shedding Based on a Point Vortex Model”, *Physics of Fluids* **16**(12), 4473–4488, 2004.
13. T. R. Bewley and B. Protas, “Skin friction and pressure: the “footprints” of turbulence”, *Physica D* **196**(1-2), 28–44, 2004.
14. B. Protas, T. R. Bewley and G. Hagen, “A comprehensive framework for the regularization of adjoint analysis in multiscale PDE systems”, *Journal of Computational Physics* **195**(1), 49–89, 2004.
15. B. Protas and J. E. Wesfreid, “On the Relation Between the Global Modes and the Spectra of Drag and Lift in Periodic Wake Flows”, *Comptes Rendus de l’Académie des Sciences IIB — Mécanique* **331**, 49–54, 2003.
16. B. Protas, “On the “Vorticity” Formulation of the Adjoint Equations and its Solution Using Vortex Method”, *Journal of Turbulence* **3**, 048, 2002.
17. B. Protas, M. Farge and K. Schneider, “Geometrical alignment properties in Fourier and wavelet filtered forced two-dimensional turbulence”, *Physical Review E* **66**, 046307, 2002.
18. B. Protas and A. Styczek, “Optimal Rotary Control of the Cylinder Wake in the Laminar Regime”, *Physics of Fluids* **14**(7), 2073–2087, 2002.
19. B. Protas and J.-E. Wesfreid, “Drag Force in the Open-Loop Control of the Cylinder Wake in the Laminar Regime”, *Physics of Fluids* **14**(2), 810–826, 2002.

20. B. Protas, A. Styczek, and A. Nowakowski, “An effective approach to computation of forces in viscous incompressible flows”, *Journal of Computational Physics* **159**, 231–245, 2000.
21. B. Protas, A. Babiano, and N. K.-R. Kevlahan, “On geometrical alignment properties of two-dimensional forced turbulence”, *Physica D* **128**, 169–179, 1999.
22. B. Protas, “Computational study of the wake control problem”, *Journal of Theoretical and Applied Mechanics* **37**(1), 13–27, 1999.
23. E. Gaudin, B. Protas, S. Goujon-Durand, J. Wojciechowski, and J.-E. Wesfreid, “Spatial properties of velocity structure functions in turbulent wake flows”, *Physical Review E* **57**(1), R9–R12, 1998.
24. B. Protas, S. Goujon-Durand, and J.-E. Wesfreid, “Scaling properties of two dimensional turbulence in wakes behind bluff bodies”, *Physical Review E* **55**(4), 4165–4169, (1997).

Conference Proceedings

25. B. Protas, “Nonlinear Preconditioning in Problems of Optimal Control for Fluid Systems”, In L. Cortelezzi and I. Mezic (Eds.), “Analysis and Control of Mixing with an Application to Micro and Macro Flow Processes”, CISM Courses and Lectures **510**, Springer, 2009.
26. B. Protas, “Vortex models for feedback stabilization of wake flows”, In R. King (Ed.), *Active Flow Control (Notes on Numerical Fluid Mechanics and Multidisciplinary Design)*, 422–436, Springer, 2007.
27. B. Protas, “Reduced-Order Optimal Feedback Control of Transition in Bluff Body Wake Flows”, In H. I. Andersson and P.-Å. Krogstad, Eds., *Advances in Turbulence X*, 45–48, CIMNE Barcelona, 2004.
28. B. Protas and T. Bewley, “Regularization opportunities in the adjoint analysis of multiscale systems”, In I. P. Castro et al., Eds., *Advances in Turbulence IX*, 505–508, CIMNE Barcelona, 2002.
29. T. Bewley and B. Protas, “Skin friction and pressure: the ”footprints” of turbulence”, Proceedings of the *3rd Symposium on Smart Control of Turbulence*, Tokyo, 2002.
30. B. Protas, K. Schneider, and M. Farge, “Alignment properties in Fourier and wavelet filtered forced two-dimensional turbulence”, In C. Dopazo et al., Eds., *Advances in Turbulence VIII*, 793–796, CIMNE Barcelona, 2000.
31. B. Protas and A. Styczek, “Flow in a 2D duct with moving boundaries — vortex blob approach”, In H. Cottet, Y. Gagnon, A. Giovannini, and E. Meiburg, Eds., *Vortex Flows and Related Numerical Methods*, volume 7 of *European Series in Applied and Industrial Mathematics - Proceedings*, 349–358. EISAM, 1999.
32. B. Protas and A. Styczek, “Theoretical and computational study of the wake control problem”, In G. E. A. Meier and P. R. Viswanath, Eds., *Mechanics of Passive and Active Flow Control - Proceedings of the IUTAM Symposium held in Göttingen, Germany, 7 - 11 September 1998*, volume 53 of *Fluid Mechanics and its Applications*, 237–242. Kluwer, 1999.
33. B. Protas and A. Babiano, “On geometrical alignment properties of two-dimensional forced turbulence”, In Uriel Frisch, Ed., *Advances in Turbulence VII*, 433–436, Kluwer, 1998.
34. B. Protas, A. Nowakowski, and S. Goujon-Durand, “Influence of the obstacle geometry on the dynamical properties of the von Karman vortex street”, *Zeitschrift zur Angewandte Mathematik und Mechanik* **78**, 675–676, 1998.
35. B. Protas and J.-E. Wesfreid, “Stretching of vorticity gradients in two-dimensional wake flow” In *Proceedings of the 11th Symposium on Turbulent Shear Flows*, number 10-1, Grenoble, 1997.
36. E. Gaudin, B. Protas, S. Goujon-Durand, J. Wojciechowski, and J.-E. Wesfreid, “On the spatial properties of turbulence in wake flows”. In *Advances in Turbulence VI*, pages 275–276. Kluwer, 1996.

Preprints

37. V. Bukshynov, O. Volkov, and B. Protas, “On Optimal Reconstruction of Constitutive Relations in Thermodynamics and Continuum Mechanics”, (submitted), 2010.
38. B. Protas, “Vortex Design Problem”, (submitted), 2010.

Other

39. B. Protas and P. Wald, “Parallel Implementation of Fast Multipole Algorithm for N-Body Problem”, Warsaw University of Technology internal report, (1999).

Recent Invited Presentations

- *Department of Mathematics, the University of Michigan, Ann Arbor, MI, January 2011.*
- *19th Canadian Symposium on Fluid Mechanics, St. John’s, NL, July 2010.*
- *Fifth European Conference on Computational Fluid Dynamics ECCOMAS CFD 2010, Lisbon, Portugal, June 2010.*
- *34th SIAM Southeastern-Atlantic Section Conference, Raleigh, NC, March 2010*
- *Department of Mathematics & Statistics, Wichita State University, Wichita, KS, February 2010.*
- *Faculty of Science, University of Ontario Institute of Technology, Oshawa, ON, October 2009.*
- *Departement des Mathématiques Appliquées, Université Bordeaux I, Bordeaux, France, May 2009.*
- *SIAM Meeting on Applied Dynamical Systems, Snowbird, UT, May 2009.*
- *Laboratoire d’Etudes Aérodynamiques, Université de Poitiers, Poitiers, France, May 2009.*
- *Winter Meeting of the Canadian Mathematical Society (session “Applied PDEs”), Ottawa, ON, December 2008.*
- *Advanced Optimization Laboratory, McMaster University, Hamilton, ON, October 2008.*
- *Industrial Physics Group, Commonwealth Scientific and Industrial Research Organisation, Sydney, NSW, Australia, August 2008.*
- *School of Mathematics, The University of Manchester, Manchester, UK, May 2008*
- *Industrial Optimization Seminar, Fields Institute Toronto, ON, April 2008.*
- *Department of Mathematics, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brasil, December 2007*
- *Department of Mathematics & Statistics, University of Ottawa, Ottawa, ON, October 2007*
- *Interdisciplinary Program “Bridging the Gaps”, The University of Sheffield, Sheffield, UK, June 2007.*
- *1st Conference on Active Flow Control, Berlin, Germany, September 2006*
- *17th Polish Conference on Fluid Mechanics (invited plenary lecture), Belchatow, Poland, September 2006*
- *Workshop on the Navier–Stokes Equation and Turbulence, Wolfgang Pauli Institute, Vienna, Austria, April 2006*
- *Department of Applied Mathematics, The University of Waterloo, Waterloo, ON, March 2006*
- *SANDIA Workshop on Large–Scale Robust Optimization, Santa Fe, NM, August 2005*
- *AFOSR Workshop on Feedback Flow Control, Jackson Hole, WY, July 2005*

- *Workshop on Analysis and Control of Mixing with an Applications to Micro and Macro Flow Processes*, Udine, Italy, June 2005
- *Institute of Aeronautics & Applied Mechanics, Warsaw University of Technology*, Warsaw, Poland, March 2005
- *Department of Mathematics & Statistics, Wichita State University*, Wichita, KS, January 2005
- *Department of Mathematics & Statistics, University of Ottawa*, Ottawa, ON, November 2004
- *Institute for Applied and Interdisciplinary Mathematics, University of Toronto*, Toronto, ON, November 2004
- *Department of Computer Science, University of Toronto*, Toronto, ON, November 2004
- *Departement des Mathématiques Appliquées, Université Bordeaux I*, Bordeaux, France, June 2004.
- *Boundary Layer Wind Tunnel Laboratory, University of Western Ontario*, London, ON, January 2004.
- *Laboratoire de Physique et Mécanique des Milieux Hétérogènes, École Supérieure de Physique et de Chimie Industrielles*, Paris, France, December 2003.
- *Laboratoire de Mécanique Dynamique, École Normale Supérieure*, Paris, France, December 2003.
- *Laboratoire des Fluides et Acoustique, École Nationale Supérieure de Techniques Avancées*, Palaiseau, France, December 2003.
- *Institute of Computational Science, Swiss Federal Institute of Technology*, Zurich, Switzerland, December 2003.
- *LadHyX, École Polytechnique*, Palaiseau, France, June 2003.
- *Institut de Mécanique des Fluides*, Toulouse, France, June 2003.
- *Department of Mathematics, University of Southern California*, Los Angeles, CA, April 2003.
- *United Technologies Research Center*, Hartford, CT, January 2001.
- *Hermann-Föttinger-Institut*, Berlin, Germany, October 2000.

Recent Conference Presentations

- *63rd Annual Meeting of the APS Division of Fluid Dynamics*, Long Beach, CA, November 2010.
- *8th European Fluids Mechanics Conference*, Bad Reichenhal, Germany, September 2010.
- *International Conference on Inverse Problems*, Wuhan, China, April 2010.
- *62nd Annual Meeting of the APS Division of Fluid Dynamics*, Minneapolis, MN, November 2009.
- *10th Joint European Thermodynamics Conference*, Copenhagen, Denmark, June 2009.
- *Conference on Optimization with interfaces and free boundaries*, Regensburg, Germany, March, 2009
- *61th Annual Meeting of the APS Division of Fluid Dynamics*, San Antonio, TX, November 2008.
- *22nd International Congress of Theoretical and Applied Mechanics*, Adelaide, SA, Australia, August 2008.
- *18th Canadian Symposium on Fluid Mechanics*, Montreal, QC, June 2008.
- *Fifth Conference on Bluff Body Wakes and Vortex-Induced Vibrations* Costa do Sauípe, Bahia, Brazil, December 2007.
- *60th Annual Meeting of the APS Division of Fluid Dynamics*, Salt Lake City, UT, November 2007.
- *Second Mathematical Programming Society International Conference on Continuous Optimization*, Hamilton, Canada, August 2007.
- *6th International Congress on Industrial and Applied Mathematics*, Zurich, Switzerland, July 2007.

- *IUTAM Symposium on Unsteady Separated Flows and Their Control*, Corfu, Greece, June 2007.
- *Workshop on the Kinematic Simulation of Turbulence*, Sheffield, UK, June 2007.
- *59th Annual Meeting of the APS Division of Fluid Dynamics*, Tampa Bay, FL, November 2006.
- *6th European Fluid Mechanics Conference*, Stockholm, Sweden, June 2006.
- *17th Canadian Symposium on Fluid Mechanics*, Toronto, ON, June 2006.
- *CAIMS–MITACS 2006 Joint Annual Conference*, Toronto, ON, June 2006.
- *58th Annual Meeting of the APS Division of Fluid Dynamics*, Chicago, IL, November 2005.
- *SIAM Conference on Control and Its Applications*, New Orleans, LA, July 2005
- *57th Annual Meeting of the APS Division of Fluid Dynamics*, Seattle, WA, November 2004.
- *Mathematics Conference in Honor of John Neuberger’s 70th Birthday*, Denton, TX, October 2004.
- *4th Annual McMaster Optimization Conference: Theory and Applications (MOPTA04)*, Hamilton, ON, July 2004.
- *10th European Turbulence Conference*, Trondheim, Norway, June 2004.
- *6th Workshop on Adjoint Applications in Dynamic Meteorology*, Acquafredda di Maratea, Italy, May 2004.
- *EUROMECH Colloquium #454 “Large Eddy Simulation, Coherent Vortex Simulation and Vortex Methods for Turbulent Flows”*, Marseille, France, April 2004.
- *56th Annual Meeting of the APS Division of Fluid Dynamics*, Rutherford, NJ, November 2003.
- *7th US National Congress on Computational Mechanics*, Albuquerque, NM, July 2003.
- *AMS–IMS–SIAM Summer Research Conference on Hydrodynamics Stability and Flow Control*, Snowbird, UT, July 2003.
- *55th Annual Meeting of the APS Division of Fluid Dynamics*, Dallas, TX, November 2002.
- *AFOSR Dynamics and Control Workshop*, Pasadena, CA, August 2002.
- *9th European Turbulence Conference*, Southampton, UK, July 2002.
- *5th Workshop on Adjoint Applications in Dynamic Meteorology*, Mt. Bethel, PA, April 2002.
- *4th International Workshop on Vortex Flows and Related Numerical Methods*, Santa Barbara, CA, March 2002.
- *54th Annual Meeting of the APS Division of Fluid Dynamics*, San Diego, CA, November 2001.
- *SIAM Conference on Control and its Applications*, San Diego, CA, July 2001.
- *Southern California Nonlinear Control Workshop*, San Diego, CA, June 2001.
- *53rd Annual Meeting of the APS Division of Fluid Dynamics*, Washington D.C., November 2000.
- *8th European Turbulence Conference*, Barcelona, Spain, July 2000.
- *IUTAM Symposium on Bluff Body Wakes and Vortex-induced Vibration*, Marseille, France, June 2000.

A total of about 90 presentations in the years 1996-2011