FRANÇOIS BLANCHETTE

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Permanent resident of the United States

RESEARCH INTERESTS: Modeling fluid networks; Multiphase flow; Interfacial flows; Numerical analysis; Geophysical flows, Fluid-solid interactions in biological systems.

EMPLOYMENT

2012- Associate Professor, Applied Mathematics Unit, University of California Merced.

2006-12 Assistant Professor, School of Natural Sciences, University of California Merced.

2004-06 Post-Doctoral researcher, University of Chicago (Supervisor: Wendy Zhang)

2003-04 Post-Doctoral researcher, University of California Santa Barbara (Supervisor Eckart Meiburg)

EDUCATION

Ph.D. Department of Mathematics, **Massachusetts Institute of Technology**, Cambridge, Massachusetts, July 2003.
Sedimentation in a Stratified Ambient, obtained under the supervision of Professor John W. M. Bush. Investigated various aspects of sedimentation in a stratified ambient including particle clouds, Boycott effect, particle–laden double–diffusive instabilities and gravity currents.

B. Sc. Dept. of Mathematics and Statistics, **Université de Montréal**, Montréal, Canada, May 1999. Graduated with highest grade point average in the academic year. Last semester spent at the University of British–Columbia as part of a student exchange program.

OTHER ACADEMIC EXPERIENCE

Organizer *Science Club of the Sierras*, Woodland Elementary School, Mariposa, CA, 2014-15.

Sabbatical McGill University, Montréal, QC, January 2014 to June 2014.

Organizer *Computations in Science Seminar*, University of Chicago, Chicago, IL, January 2005 to present.

Organizer *Graduate Applied Mathematics Seminar (SPAMS)*, MIT, Cambridge, MA, September 2001 to May 2003.

Attendee Geophysical and Environmental Fluid Dynamics summer school, DAMPT, Cambridge University, Cambridge, England, September 2002.

Attendee Pacific Institute for Mathematical Science Fluid Dynamics summer school, University of Alberta, Edmonton, Canada, May 2001.

RESEARCH EXPERIENCE

2001 Research Student, MIT funded by Schlumberger,
Studied the influence of the strength of turbulence on the time evolution of the concentration of settling particles, supervised by John Bush.

1998 Research Student, Université de Montréal,
Theoretical Neural Networks analysis and optimization, supervised by Yoshua Bengio.

1997 Research Student, CERCA Montréal, Canada,
Study and implementation of image denoising algorithms, supervised by Anne Bourlioux.

GRANTS and AWARDS

May. 2016	NSF-INCLUDES, , P.I., did not get funded.
Oct. 2014	NSF-RTG, co-P.I., did not get funded.
Jun. 2014	UC Merced Graduate Committee on Research Award, P.I. "Development and application of numerical simulations for fluid flow in complex media", in the amount of $4,757 for one year.
Jan. 2013	NSF Award, Dimensions of biodiversity committee, co-P.I, Dimensions: Collaborative research: "Do Parallel Patterns Arise from Parallel Processes?", in the amount of $1,369,982 for five years.
July 2008	NSF Award, Applied Mathematics committee, "Simulations of Surface Tension Driven Flows and Interactions Between Fluid Flow and Solid Particles", in the amount of $133,000, for three years.
2005	MRSEC Fellow, University of Chicago.
1999–2002	Canadian National Science and Engineering Research Council Post–Graduate Scholarship, type A (1999), type B (2001).
1999	MIT Presidential Fellowship.
1997	Université de Montréal Dean's Scholarship.
1997	Université de Montréal, Department of Mathematics Maurice L'Abbé Prize.
1996	Bronze medal in the International Chemistry Olympiads, Moscow, Russia.
1996	Fourth place in the Canadian Chemistry Olympiads, McGill University, Montréal, Canada.

TEACHING EXPERIENCE

Math. Model.	Instructor of record, U.C. Merced, 2017.
Part. Diff. Eqs.	Instructor of record, U.C. Merced, 2016.
Grad. Fluid Dyn.	Instructor of record, U.C. Merced, 2015.
Asymptotics Meth.	Instructor of record, U.C. Merced, 2011,13.
Grad. Num. Anal.	Instructor of record, U.C. Merced, 2012.
Topics Appl. Math.	Instructor of record, U.C. Merced, 2009-13.
Prep. Prelim.	Instructor of record, graduate level, U.C. Merced, 2006-10.
Num. Analysis	Instructor of record, U.C. Merced, 2008-09, 14.
Complex. Var.	Instructor of record, U.C. Merced, 2008-10.
Vector Calculus	Instructor of record, U.C. Merced, 2007, 10, 12, 13, 15-16
Adv. Calculus	Course lecturer, graduate level, MIT, 2002.
Diff. Eqns.	Recitation instructor, MIT, 2002; Instructor of record, U.C. Merced 2008
Calculus	Recitation instructor at MIT from the text by Simmons, spring 2001.
Fluid Dynamics	Teaching assistant at MIT, fall 2001, 02.
Workshop	Training workshop for recitation instructors, MIT September 2001.
Elementary school	Ran the Science Club at Woodland Elementary, CA, 2014-2015.
Elementary school	Volunteered as a teacher in Ghana, teaching French and Mathematics, summer 2000.

PUBLICATIONS

- "Modeling the Marine Lakes of Palau"
  F. Blanchette, M. Dawson, S. Montroy, and S. Patris, *Limnology and Oceanography*, to be submitted in Fall 2018.
- "Simulating flow over and through porous media with application to erosion of particulate deposits"
  M. Panah and F. Blanchette, accepted for publication in *Computers and Fluids*, Jan, 2018.
- "Simulations of a porous particle settling in a density-stratified ambient fluid"
  M. Panah, F. Blanchette, and S. Khatri, *Physical Review Fluids*, Nov, 2017, 2, 11, 114303
- "Octahedra as models of oscillating and bouncing drops"
  F. Blanchette, *Physical Review Fluids*, Sep. 2017, 2, 9, 093603
- "Simulations of surfactant-laden drops rising in a density-stratified medium"
  D.W. Martin and F. Blanchette, *Physical Review Fluids*, Feb. 2017, 2, 2, 023602
- "Modeling the vertical motion of drops bouncing on a bounded fluid reservoir"
  F. Blanchette, *Phys. Fluids*, Mar 2016, 28, 032104
- "Electrically-induced drop detachment and ejection"
  A Cavalli, D. Preston, E. Tio, D.W. Martin, N. Miljkovic, E. N. Wang, F. Blanchette, and J.W.M. Bush *Phys. Fluids*, Feb. 2016, 28, 022101
- "MAGIC: Model-Based Actuation for Ground Irrigation Control"
  D. A. Winkler, R. Wang, F. Blanchette, M. Carreira-Perpinan and A. E. Cerpa, *15th ACM/IEEE International Conference on Information Processing in Sensor Networks (IPSN)*, Vienna, 2016, pp. 1-12.
- "The Boycott effect as a source of intrusions in magma chambers",
  F. Blanchette, T. Peacock, and J.W.M. Bush, chapter in *Layered Intrusions*, edited by B. Charlier, C. Tegner, R. Latyov and O. Namur, Springer, New York, May 2015.
- "Simulations of surfactant effects on the coalescence of drops and bubbles"
  D.W. Martin and F. Blanchette, *Physics of Fluids*, Jan 2015, 27, 012103
- "The influence of suspended drops on peristaltic pumping"
  F. Blanchette, *Phys. Fluids*, Jun. 2014, 26, 061902
- "Mixing and convection driven by particles settling in temperature stratified ambients"
  F. Blanchette*, *International Journal of Heat and Mass Transfer*, January 2013, 56 (1-2), 732–740.
- "Modeling huddling penguins"
  A. Waters, F. Blanchette* & A.D. Kim, *PLoS ONE*, November 2012, 7 (11), e50277
- "Drops settling in sharp stratification with and without Marangoni effects"
  F. Blanchette* & A.M. Shapiro, *Physics of Fluids*, April 2012, 24(4), 042104
- "Settling-induced heat transport"
  F. Blanchette*, W. Douandju & S.M. Montroy, *Physics of Fluids*, December 2010, 22 (12), 123304.
- "Simulation of mixing within drops due to surface tension variations"
  F. Blanchette*, *Physical Review Letters*, August 2010, 105 (7), 074501

PUBLICATIONS continued

- "Blanchette and Zhang reply"
  F. Blanchette* & WW. Zhang, *Physical Review Letters*, August 2010, 105(8), 089402.
- "The influence of surface tension gradients on drop coalescence** "
  F. Blanchette*, L. Messio & J.W.M. Bush, *Physics of Fluids*, July 2009, 21(7), 072107.
- "Flow lines and mixing within drops in microcapillaries "
  F. Blanchette*, *Physical Review E*, June 2009, 80 (6), 066316
- "Energy considerations for multiphase fluids with variable density and surface tension" F. Blanchette* & Y. Lei, SIAM Review, May 2009, 51(2), 423–431.
- "Force Balance at the Transition from Selective Withdrawal to Viscous Entrainment" F. Blanchette* & W. W. Zhang, *Physical Review Letters*, April 2009, 102, 144501.
- "Dynamics of drop coalescence at fluid interfaces"
  F. Blanchette* & T.P. Bigioni, *Journal of Fluid Mechanics*, 620, 333–352, February 2009
- "Stability of a stratified fluid with a vertically moving sidewall"
  F. Blanchette*, T. Peacock & R. Cousin, *Journal of Fluid Mechanics*, August 2008, 609, 305–317
- "Evaluation of a simplified approach simulating gravity currents over slopes of varying angles"
  F. Blanchette*, V. Piche, E. Meiburg & M. Strauss, *Computers & Fluids*, June 2006, 35 (5), pp 492–500.
- "Partial coalescence of drops at liquid interfaces "
  F. Blanchette*, T.P. Bigioni, *Nature-Physics*, April 2006, 2(4), 254–257.
- "High-resolution numerical simulations of resuspending gravity currents: conditions for self-sustainment"
  F. Blanchette*, M. Strauss, E. Meiburg, B. Kneller & M.E. Glinsky, *Journal of Geophysical Research*, December 2005, 110 (C12), C12022.
- "High Resolution Simulations of Particle-Driven Gravity Currents"
  E. Meiburg*, F. Blanchette, M. Strauss, B. Kneller, M.E. Glinsky, F. Necker, C. Härtel and L. Kleiser, Proceedings of IMECE2005 2005 ASME International Mechanical Engineering Congress and Exposition, Orlando, November 2005.
- "Hindered settling in a stably stratified ambient"
  F. Blanchette* & J. W. M. Bush, *Physics of Fluids*, July 2005, 17 (7): Art. No. 073302.
- "The stratified Boycott effect"
  T. Peacock*, F. Blanchette & J. W. M. Bush, *Journal of Fluid Mechanics*, April 2005, vol 529, pp 33–49.
- "The Boycott effect in magma chambers"
  F. Blanchette*, T. Peacock & J. W. M. Bush, *Geophysical Research Letters*, March 2004, vol 31, No 5., L05611.
- "Particle clouds in homogeneous and stratified environments"
  J. W. M. Bush*, B. A Thurber & F. Blanchette, *Journal of Fluid Mechanics*, August 2003, vol 489, pp 29–54.
- "Sedimentation in a stratified ambient"
  F. Blanchette, Ph.D. Thesis presented to the Mathematics department of the Massachusetts Institute of Technology, July 2003.

* indicates the corresponding author.
** indicates within the top 20 downloaded articles for this journal during that year.

PATENTS

- "High resolution numerical simulations of resuspending gravity currents"
  F. Blanchette, M. D. Strauss, E. H. Meiburg, B. C. Kneller, M. E. Glinsky, *US-patent office*, 2007

POSTER PRESENTATIONS

Nov. 2004	High-Resolution numerical simulations of resuspending gravity currents: conditions for self-sustainment, *American Geophysical Union Meeting*, San Francisco, CA, USA.
May. 2004	Settling in a stratified ambient, *Southern California Applied Mathematics Symposium*, Claremont, CA, USA.

ORAL PRESENTATIONS

Jan. 2017	Drops settling in stratified ambients, *Applied Mathematics Seminar*, Cal Poly, Santa Cruz, Ca, USA.
Nov. 2016	An octahedron model for oscillating, bouncing drops, *APS Division of Fluid Dynamics Annual Meeting*, Portland, Or, USA.
Mar. 2016	A detailed model of a quantum analog: Forced Bouncing Drops, *Physics Seminar*, Cal Poly, San Luis Obispo, Ca, USA.
Nov. 2015	Simulations of surfactant-laden drops rising in stratified and unstratified media, *APS Division of Fluid Dynamics Annual Meeting*, Boston, Ma, USA.
Mar. 2015	A detailed model of bouncing drops, *Physical Mathematics Seminar*, MIT, Cambridge, USA.
Nov. 2014	A detailed model of bouncing drops, *APS Division of Fluid Dynamics Annual Meeting*, San Diego, Ca, USA.
Sep. 2014	Waves and particles in fluids (and elsewhere?), *Applied Mathematics Seminar*, UC Merced, Merced, USA.
Aug. 2014	Simulating a moving interface between porous media and pure fluid, *Mathematical Modeling of particle-laden fluids* , BIRS, Banff, Ab, Canada.
Mar. 2014	The effects of surface tension variations on coalescing and settling drops, *Physical Mathematics Seminar*, MIT, Cambridge, USA.
Jan. 2014	Overview of partial coalescence, *Applied Mathematics seminar*, University McGill, Montréal, Canada.
Mar. 2013	How temperature variations affect sediments, drops and penguins, *Mechanical Engineering seminar*, University of Nevada Reno, Nv, USA.
Nov. 2012	"Modeling huddling penguins", *APS Division of Fluid Dynamics Annual Meeting*, San Diego, Ca, USA.
Oct. 2012	"Modeling huddling penguins", *Mathematics seminar*, California State University Stanislaus, Ca, USA.
Jul. 2012	"Drop dynamics in the presence of surface tension variations", *Scientific & Engineering Computing seminar*, Beijing University, Beijing, China.
Feb. 2012	"Drops and particles settling in density gradients", *Center for Interdisciplinary Research in Fluid Physics Seminar*, UCSB, Santa Barbara, Ca, USA.
Nov. 2011	"Drops settling in a sharp stratification with and without Marangoni effects", *APS Division of Fluid Dynamics Annual Meeting*, Baltimore, Md, USA.
Nov. 2010	"Settling-induced heat transport", *APS Division of Fluid Dynamics Annual Meeting*, Long Beach, Ca, USA.
Jun. 2010	"Drop Coalescence in the Inertial Regime", *Waves IV*, University of Alberta, Edmonton, Ab, Canada.
Nov. 2009	"Streamlines and mixing patterns for drops in capillaries", *APS Division of Fluid Dynamics Annual Meeting*, Minneapolis, Mn, USA.
Nov. 2008	"Partial and total coalescence in the presence of surface tension gradients", *APS Division of Fluid Dynamics Annual Meeting*, San Antonio, Tx, USA.
Nov. 2008	"The applied Mathematics graduate program at UC Merced", *Special seminar*, California State Fresno and Bakersfield, Ca, USA.
Nov. 2007	"Stability of a stratified fluid with a vertically moving boundary", *APS Division of Fluid Dynamics Annual Meeting*, Salt Lake City, Ut, USA.
Oct. 2007	"Coalescing and flowing drops", Mathematics Colloquium, UCD, Davis, Ca, USA.
Feb. 2007	Flowing drops and partial coalescence, *Research Seminar in Applied Mathematics*, UCM, Merced, Ca, USA.
Nov. 2006	Transition flow rate in viscous withdrawal, *APS Division of Fluid Dynamics Annual Meeting*, Tampa Bay, Fl, USA.
Dec. 2006	Drops and particles in a liquid, *Applied Mathematics seminar*, UCB, Berkeley, Ca, USA.
Apr. 2006	Drops and particles in a fluid, *Mechanical Engineering fluid seminar*, Stanford University, Palo Alto, Ca, USA.
Mar. 2006	Multiple Coalescence at a fluid interfaces, *Applied Mathematics seminar*, University of Alberta, Edmonton, Ab, Canada.
Feb. 2006	Multiple Coalescence at a fluid interfaces, *Dept. of Mathematics seminar*, York University, Toronto, On, Canada.
Feb. 2006	Drops and particles in a fluid, *Applied Math Research seminar*, University of California, Merced, Ca, USA.
Jan. 2006	"Multiple Coalescence at Liquid Interfaces", *GALCIT Fluid Mechanics Seminar*, California Institute of Technology, Pasadena, Ca, USA.

ORAL PRESENTATIONS continued

Dec. 2005	"Sedimentation in a Stratified Ambient", *Monday Applied Mathematics seminar*, Beijing University, Beijing, China.
Nov. 2005	"Multiple Coalescence at Liquid Interfaces", *Center for Interdisciplinary Research in Fluid Physics Seminar*, UCSB, Santa Barbara, Ca, USA.
Aug. 2005	" Simulations of interfacial flows: from multiple
Nov. 2005	"Multiple coalescence and Pinch off at a Fluid Interface", *APS Division of Fluid Dynamics Annual Meeting*, Chicago, Il, USA.
Nov. 2005	"Multiple Coalescence at Liquid Interfaces", *Physical Mathematics Seminar*, MIT, Cambridge, Ma, USA.
Feb. 2005	"Sedimentation in a Stratified Ambient", *Mechanical Engineering Department seminar*, University of British-Columbia, B.C., Canada.
Jan. 2005	"Sedimentation in a Stratified Ambient", *Engineering Science and Applied Mathematics seminar*, Northwestern University, Chicago, Il., USA.
Nov. 2004	"High-resolution Numerical Simulations of Resuspending Gravity Currents: Conditions for Self-Sustainment", *APS Division of Fluid Dynamics Annual Meeting*, Seattle, Wa, USA.
Mar. 2004	"Combined Effects of Particles and Stratified Ambient", *Lunch Bag Seminar*, University of Chicago, Il, USA.
Nov. 2003	"Hindered settling in a stratified ambient", *APS Division of Fluid Dynamics Annual Meeting*, Meadowlands, NJ, USA.
Jul. 2003	"Sedimentation in a Stratified Ambient", *Thesis Defence*, MIT, Cambridge, Ma, USA.
May 2003	"The Stratified Boycott Effect", *Brown Bag Seminar*, UCSB, Santa Barbara, Ca, USA.
Apr. 2002	"Gravity Currents in a Rotating Frame", *Brown Bag Seminar*, MIT, Cambridge, Ma, USA.
Feb. 2002	"Double–Diffusive Instabilities", *Graduate Applied Math Seminar (SPAMS)*, MIT, Cambridge, Ma, USA.
Nov. 2001	"Sedimentation and Deposition Patterns from a Turbulent Suspension", *APS Division of Fluid Dynamics Annual Meeting*, San Diego, Ca, USA.
Oct. 2001	"Reentrainment and Sedimentation in a Turbulent Suspension", *Brown Bag Seminar*, MIT, Cambridge, Ma, USA.
Apr. 2001	"Surface Growth Models", *Graduate Applied Math Seminar (SPAMS)*, MIT, Cambridge, Ma, USA.
Apr. 2000	"Skipping Stones", *Graduate Applied Math Seminar (SPAMS)*, MIT, Cambridge, Ma, USA.
Jul. 1997	"Image Denoising", *Canadian Undergraduate Mathematics Conference*, Université de Montréal, Montréal, Canada.

REVIEW ACTIVITY

2013	Geophysical Research Letters
2012	Public Library of Science ONE
2012	Journal of Computational Physics
2011	International Journal of Multiphase Flow
2011	Nature Communications
2010,11	Environmental Fluid Mechanics
2010	AIChE Journal
2009	NSERC (proposal)
2009, 11,12	Petroleum Research Fund (proposal)
2009,12	European Journal of Mechanics -B/Fluids
2009-2011,14	Journal of Fluid Mechanics
2008, 2012	Journal Hydraulic Research
2006-14	Physical Review E.
2006	European Physical Journal E
2006-13	Physical Review Letters
2005-06, 08	Journal of Geophysical Research
2005, 08-14	Physics of Fluids

MEMBERSHIP

Since 2002	American Physical Society

In the press

Jan 2013	"Warmth of the penguins", Bradley Cornelius, Academic minute, Northeast public radio.
Nov 2012	"Penguins: The Math Behind The Huddle", Katharine Gammon, Inside Science News Service.
Nov 2012	"Can Loving Penguins Inspire a Love of Math That Could Help Save Our Planet?", Christine Lepisto, TreeHugger.com