

# Michael Lindstrom

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## Current Position

Assistant Adjunct Professor (Program in Computing), Mathematics Department, University of California at Los Angeles (2015–present).

## Education

B.Sc. Physics and Mathematics (Hons.), University of British Columbia.  
M.Sc. Mathematics, University of British Columbia.  
PhD. Mathematics, University of British Columbia.

## Research Areas

machine learning, partial differential equations, industrial modelling, formal asymptotics, scientific computing

## Research

### *Journal Articles*

#### **In Preparation**

1. *Local in Time Existence of Solutions to a Nonlinear PDE Model for Population Dynamics with Nonlocal Transport and Competition* - **M.R. Lindstrom** and A.L. Bertozzi
2. *Regular Perturbations of SIAR-models for infectious diseases and applications in the study of non-compliance* - M. Bongarti, L. Hatcher, D. Galvan, **M. R Lindstrom**, C. Parkinson, C. Wang, and A.L. Bertozzi

#### **Preprints/Submitted/Under Revision**

3. *Using Local Geographic Features to Predict Changes in the Los Angeles Homeless Population* - **M. R. Lindstrom**, R. S. Du, X.Y. Ng, D. Diaz, M. Nero, M. Koulikova, H. Ross, S. Shukla, A. Bertozzi, and P. J. Brantingham (Preprint)

## Accepted/Published Journal Articles

4. *Networks of Necessity: Impacts of COVID-19 Mitigation Strategies on Disabled and Caregiver Communities* - T. E. Valles, H. Sheonhard, S. Trick, J.M. Zinski, M.A. Porter, **M. R. Lindstrom** (accepted to PLoS Computational Biology)
5. *A Multilayer Network Model of the Coevolution of the Spread of a Disease and Competing Opinions* - K. Peng, Z. Lu, V. Lin, **M.R. Lindstrom**, C. Parkinson, C. Wang, A.L. Bertozzi, and M.A. Porter (2021, accepted to M3AS special issue on COVID-19)
6. *From reaction kinetics to dementia: a simple dimer model of Alzheimer's disease etiology* - **M. R. Lindstrom**, M. B. Chavez, E. A. Gross-Sable, E. Y. Hayden, and D. B. Teplow (2021, PLoS Computational Biology)
7. *Functional Kernel Density Estimation: Point and Fourier Approaches to Time Series Anomaly Detection* - **M.R. Lindstrom**, H. Jung, and D. Larocque (2020, Entropy)
8. *Qualitative features of a nonlinear, nonlocal, agent-based PDE model with applications to homelessness* - **M. R. Lindstrom** and A.L. Bertozzi (2020, M3AS special issue on Swarms, Crowds, and Social Systems)
9. *Investigation of Constant Volume and Constant Flux Initial Conditions on Bidensity Particle-Laden Slurries on an Incline* - D. Diaz, A. Prins, J. Bojorquez, J. Crasto, M. Koulikova, T. Latib, A. Shapiro, and C. Ye., D. Arnold, C. Falcon, **M. Lindstrom**, and A. L. Bertozzi. (2019, American Journal of Undergraduate Research)
10. *Fast equilibration dynamics of viscous particle-laden flow* - J. Wong, **M. Lindstrom**, and A.L. Bertozzi (2019, Journal of Fluid Mechanics)
11. *Conversion of Waste Water and Carbon Dioxide into Value-Added Chemicals by Electrodialysis* - S. Dara, **M. Lindstrom**, J. English, A. Bonakdarpour, B. Wetton, and D. Wilkinson (2017, Journal of CO2 Utilization)
12. *Assessment of the Effects of Azimuthal Mode Number Perturbations upon the Implosion Processes of Fluids in Cylinder* - **M. Lindstrom** (2017, Physica D)
13. *Effect of Surface Roughness on the Magnetic Field Profile in the Meissner State of a Superconductor* - **M. Lindstrom**, C.Y. Fang, R. Kiefl (2015, Journal of Superconductivity and Novel Magnetism)
14. *Electric Ion Dispersion as a New Type of Mass Spectrometer* - **M. Lindstrom**, I. Moyles, K. Ryczko (2016, Mathematics-in-Industry: Case Studies)
15. *Asymptotic Analysis of a Magnetized Target Fusion Reactor* - **M. Lindstrom** (2015, SIAM Journal on Applied Mathematics)
16. *From Exam to Education: The Math Exam/Educational Resources wiki* C. Bruni, C. Koch, B. Konrad, **M. Lindstrom**, I. Moyles, W. Thompson (2015, Problems, Resources, and Issues in Mathematics Undergraduate Studies)
17. *Investigation into Fusion Feasibility of a Magnetized Target Fusion Reactor: A Preliminary Numerical Framework* - **M. Lindstrom**, B. Wetton, S. Barsky (2014, Journal of Fusion Energy)
18. *A Comparison of Fick and Maxwell-Stefan Diffusion Formulations in PEMFC Cathode Gas Diffusion Layers* - **M. Lindstrom**, B. Wetton (2016, Heat and Mass Transfer)
19. *Assessing the optimal virulence of malaria-targeting mosquito pathogens: a mathematical study of engineered *Metarhizium anisopliae** - B. Konrad, **M. Lindstrom**, A. Gumpinger, J. Zhu, D. Coombs (2013, Malaria Journal)
20. *Mathematical modelling of the effect of surface roughness on magnetic field profiles in type II superconductors* - **M. Lindstrom**, B. Wetton, R. Kiefl (2013, Journal of Engineering Mathematics)

*Proceedings and Technical Reports***Peer-Reviewed**

21. *Reconstructing piezoelectric responses over a lattice: adaptive sampling of low dimensional time series representations based on relative isolation and gradient size* - **M.R. Lindstrom**, W. J. Swartworth, and D. Needell (Accepted to SMC 2021 Proceedings)
22. *Modelling the Effects of Surface Roughness on Superconductors* **M. Lindstrom**, B. Wetton, R. Kiefl (2012, Physics Procedia, special issue for 12th International Conference on Muon Spin Rotation, Relaxation and Resonance ( $\mu$ SR 2011))

**Not Peer-Reviewed**

23. *Networks of Necessity: Preventing COVID-19 Among Disabled People and Their Caregivers* - **M.R. Lindstrom**, M.A. Porter, H. Sheonhard, S. Trick, T. Valles, and J.M. Zinski (2020 whitepaper)
24. *Poisson Regression for Smooth Geographic Stratification of Risk* - D. Boursicot, M. Comeau, P. Gagnon, C. Gauvin, R. Han, B. Ferland-Raymond, **M. Lindstrom**, N. Razaaly, J. Schulz, J. Shen, T. Wong, and R. Eghbalzadeh (2019, GERAD Technical Paper)

*Theses*

25. *Investigation into the Feasibility and Operation of a Magnetized Target Fusion Reactor : Insights from Mathematical Modelling* (PhD Thesis, 2015)
26. *Asymptotic and Numerical Modeling of Magnetic Field Profiles in Superconductors with Rough Boundaries and Multi-Component Gas Transport in PEM Fuel Cell* (Masters Thesis, 2010)
27. *Computation of Gluon Scattering Amplitudes in  $N=4$  SYM Gauge Theory via AdS-CFT Duality* (Honours Thesis, 2008)

*Selected Talks, Conferences, and Workshops*

Portland State University Applied Math Colloquium, Portland, Oregon, 2022 (talk).

University of Texas at San Antonio Applied Math Seminar, online, 2021 (talk).

Texas Tech University Math Colloquium, online, 2021 (talk).

Smoky Mountains Computational Sciences and Engineering Conference, online, 2021 (poster).

BIRS Workshop: New Trends in Nonlinear Diffusion: a Bridge between PDEs, Analysis and Geometry, online, 2021 (attendee).

CRM Industrial Problem Solving Workshop, online, 2021 (mentor).

CAIMS 2021, virtual conference (2 talks).

Oakland University Applied Math Colloquium, virtual presentation, 2021 (talk).

UC Riverside PDE and Applied Math Seminar, virtual presentation, 2020 (talk).

CRM Industrial Problem Solving Workshop, online, 2020 (participated: solving IATA anomaly problem).

Portland State University Applied Math Colloquium, virtual presentation, 2020 (talk).

UC Merced Applied Colloquium, Merced, California, USA, 2020 (talk).

NSF ATD+AMPS Workshop, Washington, DC, USA, 2019 (poster).

UCLA Applied Math Colloquium, Los Angeles, USA, 2019 (talk).

CRM Industrial Problem Solving Workshop, Montreal, Canada, 2019 (participated: solving insurance risk stratification problem).

CAIMS 2019, Whistler, Canada, 2019 (2 talks).

Mount Allison University Math Colloquium, Sackville, New Brunswick, Canada, 2017 (talk).

UCLA Undergraduate Math Students Association Professor Talk, Los Angeles, USA, 2017 (invited talk).

CAIMS 2017, Halifax, Canada, 2017 (talk).

SoCal Fluids 2017, San Diego, USA, 2017 (talk).

SIAM, Boston, USA, 2016 (invited talk).

CAIMS, Edmonton, Canada, 2016 (talk).

UCLA Applied Math Colloquium, Los Angeles, USA, 2016 (talk).

UBC Math Department Colloquium, Vancouver, Canada, 2014 (talk).

UBC Undergraduate Mathematics Colloquium, Vancouver, Canada, 2014 (talk).

Fields-MPrime Industrial Problem Solving Workshop, Toronto, Canada, 2014 (participated: solving mass spectrometry problem).

UBC Graduate Mathematics Colloquium, Vancouver, Canada, 2013 (talk).

Simon Fraser University Applied Math Colloquium, Burnaby, Canada, 2013 (invited talk).

CRM Industrial Problem Solving Workshop, Montreal, Canada, 2013 (participated: solving Brittle Bone Disease problem).

Institute for Applied Mathematics Retreat, Vancouver, Canada, 2013 (talk).

CAIMS, Toronto, Canada, 2012 (talk).

UBC Undergraduate Mathematics Colloquium, Vancouver, Canada, 2012 (talk).

AMMCS, Waterloo, Canada, 2011 (talk).

ICIAM, Vancouver, Canada, 2011 (poster).

$\mu$ SR2011, Cancun, Mexico, 2011 (poster).

PIMS YRC, Vancouver, Canada, 2011 (talk).

Institute for Applied Mathematics Retreat, Vancouver, Canada, 2011 (talk).

Institute for Applied Mathematics Retreat, Vancouver, Canada, 2010 (talk).

TRIUMF Summer Student Presentations, Vancouver, Canada, 2008 (talk).

Pacific Undergraduate Physics and Astronomy Conference, Vancouver, Canada 2008 (talk).

### *Mentoring Experience*

Mentor for CRM Industrial Problem Solving Workshop, online, 2021.

Supervising undergraduates on sampling methods for the homeless population, 2021.

Supervising undergraduates on models of prion diseases, 2021.

Supervising graduates and undergraduates on multiple models for COVID-19, 2020.

Supervising undergraduate research on a network model of COVID-19, 2020.

Supervising undergraduates and graduates in studying homicide data, 2019.

Supervising undergraduates in modelling Alzheimer's Disease, 2019.

Supervising undergraduates and graduates in analyzing and finding patterns within Twitter data from Los Angeles, 2018.

Supervising undergraduates in studying the effectiveness of a gang reduction intervention program, 2018.

Supervising undergraduates in modelling homeless movement patterns, 2017-2018.

Supervising undergraduates in modelling homeless crime, 2017.

Supervising undergraduates in fluid dynamics modelling and experimentation for bidensity slurries, 2017.

Supervising undergraduates and graduates in fluid dynamics modelling and experimentation for monodisperse slurries, 2016.

Supervising undergraduate research on superconductivity, 2014.

### *Research Positions*

MITACS Internship with Automotive Fuel Cell Cooperation, 2009.

TRIUMF Summer Research, 2009.

NSERC USRA Physics Summer Student, 2008.

NSERC USRA Math Summer Student, 2007.

### *Referee Experience By Topic*

Scientific Computing

Mathematical Modelling

Mechanical Engineering

## Selected Honours, Awards, and Fellowships

Smoky Mountains Computational Sciences and Engineering Conference Best Solution Runner Up (Advanced Category), 2021.

NSERC Postdoctoral Fellowship, 2017.

AARMS Postdoctoral Fellowship, 2015 (declined offer).

UBC Math Department Graduate Research Award in Applied Mathematics, 2014.

Westcoast Energy Inc. Jack Davis Scholarship in Energy Studies, 2012-2013.

MITACS Industrial Scholarship, 2010.

NSERC PGS-M Scholarship, 2008–2010.

Graduate Entrance Scholarship, 2008.

NSERC USRA Summer Student Award, 2007.

Dean's Honour List, University of British Columbia, 2004–2007.

NSERC USRA Summer Student Award, 2006.

Charles and Jane Banks Scholarship, 2006.

Trek Excellence Scholarship, 2005.

Undergraduate Scholar Program Scholarship, 2004.

## Academic Experience

### *Department Service and Academic Roles*

Course Development committee member UCLA, 2021–present

Undergraduate Studies committee member UCLA, 2020–2021

Supervising teaching assistants, 2015–present

Math Learning Centre committee member, 2014–2015.

Review session facilitator for Math 100&180 (differential calculus - physics and engineering), UBC, 2013.

Review session facilitator for Math 104 (differential calculus - commerce and social sciences), UBC, 2013.

WebWorK (online open source homeworks) Problem Creator/Developer, Math and Stats Department, UBC, 2013.

Review session facilitator for Math 105 (integral calculus - commerce and social sciences), UBC, 2013.

Tutor (tutorial centre), UBC, 2013.

Workshop facilitator for Math 180&184, calculus students without high school calculus, UBC, 2011.

Grader for Math 400 (applied partial differential equations), UBC, 2010.

TA for Math 104 (differential calculus - commerce and social sciences), UBC, 2010.

Math and Physics tutor, Alma Mater Society of UBC, 2007–2010.

Grader and review session facilitator for Math 152 (linear algebra), UBC, 2009.

### *Teaching Development and Accomplishments*

Letter from Dean of Science for high teaching performance at UBC, 2013.

TA Accreditation Program, 2012.

ISW Facilitator Development Workshop, 2012.

Instructional Skills Workshop (ISW), 2011.

### *Courses Taught*

Directed Research, UCLA, 2017-2021 (nine quarters)

Advanced Programming (C++), UCLA, 2020-2021 (three quarters)

Intermediate Programming (C++), UCLA, 2016-2020 (nine quarters)

Mathematical Modelling, UCLA, 2016-2017 (four quarters)

Introduction to Web Programming, UCLA, 2016, 2018-2019 (six quarters)

Introduction to Computing (C++), UCLA, 2015-2016 (seven quarters)

Directed Studies in Mathematics, UBC, 2014 (one term)

Elementary Differential Equations, UBC, 2014 (one term)

Differential Calculus with Applications to Commerce and Social Sciences, UBC, 2012 (one term)

Integral Calculus with Applications to Commerce and Social Sciences, UBC, 2012, 2015 (two terms)

Integral Calculus with Applications to Life Sciences, UBC, 2011 (one term)

Integral Calculus with Applications to Physical Sciences and Engineering, UBC, 2010 (one term)

## Miscellaneous Skills, Credentials, and Activities

### *Training and Experience*

Programming: C++, Python, Matlab, HTML/CSS, JavaScript, PHP, SQLite, C.

Human Subjects Protection Certification Training

Lab Safety Training and Laser Safety Training

Languages: English and basic French.

### *Selected Software Written*

Feedforward Neural Network (C++)

Nelder-Mead Optimization (C++)

Online Teaching/Class Participation Software (JavaScript/PHP)

### *Volunteer Activities*

Volunteer, Coordinator, and Instructor for various non-profit groups 2005–present.

Math Education Resources wiki contributor, 2012–2015.

Teaching peer reviewer, 2012–2015.

Institute for Applied Mathematics Student Committee, 2013–2014.

Sprouts Food Co-op cook, 2013-2015.

Organizing committee member of PIMS YRC, Vancouver, Canada, 2014.

Grader for Euclid Mathematics Contest, 2011.

Greater Vancouver Regional Science Fair Committee Member, 2008–2010.

Physics Olympics Volunteer, 2006, 2007.

Last updated: December, 2021