

Lauren D Smith

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Employment History

2021 – present	Lecturer The University of Auckland, New Zealand Department of Mathematics
2018 – 2020	Postdoc The University of Sydney, Australia School of Mathematics and Statistics Supervisor: Prof. Georg Gottwald
2016 – 2018	Postdoc Northwestern University, USA Department of Chemical and Biological Engineering Supervisors: Prof. Julio Ottino, Prof. Richard Lueptow, Prof. Paul Umbanhowar

Education

2012 – 2016	PhD Monash University, Clayton, Australia Department of Mechanical and Aerospace Engineering Supervisor: Prof. Murray Rudman Co-supervisors: Dr. Guy Metcalfe, Dr. Daniel Lester (RMIT) Thesis Title: Chaotic advection in a 3D volume-preserving potential flow
2010 – 2012	Master of Science Monash University, Clayton, Australia School of Mathematics and Statistics Supervisor: Dr. Daniel Delbourgo Thesis Title: Controlling Selmer Groups over Affinoid Algebras Honours Equivalent Grade: 94.5%
2009	Honours Degree of Bachelor of Science (Science Scholar Program) Monash University, Clayton, Australia School of Mathematics and Statistics Thesis Title: Representation Theory Overall Grade: 96%
2007 – 2008	Bachelor of Science (Science Scholar Program) Monash University, Clayton, Australia Double major in Mathematics (Pure and Applied)

Publications

Google Scholar Profile: <https://goo.gl/2wQEwY>

The following were published under my previous name: Lachlan D Smith

LD Smith and GA Gottwald, *Model reduction for the collective dynamics of globally coupled oscillators: From finite networks to the thermodynamic limit*, Chaos, 30(9), 093107 (2020), doi: [10.1063/5.0009790](https://doi.org/10.1063/5.0009790)

W Yue, **LD Smith** and GA Gottwald, *Model reduction for the Kuramoto-Sakaguchi model: The importance of non-entrained rogue oscillators*, Phys. Rev. E, 101, 062213 (2020), doi: [10.1103/PhysRevE.101.062213](https://doi.org/10.1103/PhysRevE.101.062213)

LD Smith and GA Gottwald, *Chaos in networks of coupled oscillators with multimodal natural frequency distributions*, Chaos, 29(9), 093127 (2019), doi: [10.1063/1.5109130](https://doi.org/10.1063/1.5109130)

LD Smith, PB Umbanhowar, RM Lueptow and JM Ottino, *The geometry of cutting and shuffling: An outline of possibilities for piecewise isometries*, Physics Reports, 802(4), 1-22 (2019), doi: [10.1016/j.physrep.2019.01.003](https://doi.org/10.1016/j.physrep.2019.01.003)

TF Lynn, **LD Smith**, JM Ottino, PB Umbanhowar and RM Lueptow, *Cutting and shuffling a hemisphere: Nonorthogonal axes*, Phys. Rev. E, 99(3), 032204 (2019), doi: [10.1103/PhysRevE.99.032204](https://doi.org/10.1103/PhysRevE.99.032204)

LD Smith, PB Umbanhowar, JM Ottino and RM Lueptow, *Optimized mixing by cutting-and-shuffling*, SIAM J. Appl. Dyn. Syst., 17(4), 2544-2573 (2018), doi: [10.1137/18M1176804](https://doi.org/10.1137/18M1176804)

LD Smith, G Metcalfe and JM Ottino, *Chaos and the flow capture problem: Polluting is easy, cleaning is hard*, Phys. Rev. Applied, 10, 034055 (2018), doi: [10.1103/PhysRevApplied.10.034055](https://doi.org/10.1103/PhysRevApplied.10.034055) (Editors' Suggestion article)

LD Smith, PB Umbanhowar, JM Ottino and RM Lueptow, *Mixing and transport from combined stretching-and-folding and cutting-and-shuffling*, Phys. Rev. E, 96, 042213 (2017), doi: [10.1103/PhysRevE.96.042213](https://doi.org/10.1103/PhysRevE.96.042213)

LD Smith, PP Park, PB Umbanhowar, JM Ottino and RM Lueptow, *Predicting mixing via resonances: Application to spherical piecewise isometries*, Phys. Rev. E, 95, 062210 (2017), doi: [10.1103/PhysRevE.95.062210](https://doi.org/10.1103/PhysRevE.95.062210) (PRE Kaleidoscope)

LD Smith, M Rudman, DR Lester and G Metcalfe, *Localized shear generates three-dimensional transport*, Chaos, 27(4), 043102 (2017), doi: [10.1063/1.4979666](https://doi.org/10.1063/1.4979666)

LD Smith, M Rudman, DR Lester and G Metcalfe, *Impact of discontinuous deformation upon the rate of chaotic mixing*, Phys. Rev. E, 95, 022213 (2017), doi: [10.1103/PhysRevE.95.022213](https://doi.org/10.1103/PhysRevE.95.022213) (Editors' Suggestion article)

LD Smith, M Rudman, DR Lester and G Metcalfe, *Bifurcations and Degenerate Periodic Points in a 3D Chaotic Fluid Flow*, Chaos, 26(5), 053106 (2016), doi: [10.1063/1.4950763](https://doi.org/10.1063/1.4950763) (Cover article)

LD Smith, M Rudman, DR Lester and G Metcalfe, *Mixing of Discontinuously Deforming Media*, Chaos, 26(2), 023113 (2016), doi: [10.1063/1.4941851](https://doi.org/10.1063/1.4941851) (Cover article)

LD Smith, M Rudman, DR Lester and G Metcalfe, *Coherent Structures in a Three-dimensional Chaotic Potential Flow*, Proc. 19th Australasian Fluid Mechanics Conference (2014)

DR Lester, **LD Smith**, G Metcalfe and M Rudman, *Beyond Hamiltonian: Chaotic Advection in a Three-dimensional Volume-preserving Flow*, Proc. 9th Int. Conf. on CFD in the Minerals and Process Industries (2012)

LD Smith, DR Lester and G Metcalfe, *Chaotic Advection in a Three-dimensional Volume-preserving Potential Flow*, Proc. 18th Australasian Fluid Mechanics Conference (2012)

Conferences, Workshops and Invited Seminars

- 2020** **Sydney Dynamics Group Workshop**, Jervis Bay, NSW, Australia
Mesoscopic reduction of sparse oscillator networks
- 2020** **Dynamics Days Digital**, online
Model reduction for the collective dynamics of globally coupled oscillators: From finite networks to the thermodynamic limit
- 2019** **AustMS Annual Meeting**, Monash University, VIC, Australia
Model reduction for the collective dynamics of networks of coupled oscillators
- 2019** **Sydney Dynamics Group Workshop**, Margaret River, WA, Australia
Data driven techniques for dynamics on networks
- 2019** **University of Queensland Applied Mathematics Seminar**, The University of Queensland, QLD, Australia
Model reduction for the collective dynamics of networks of coupled oscillators
- 2019** **Northwestern Institute on Complex Systems (NICO) Seminar**, Northwestern University, IL, USA
Chaos in networks of coupled oscillators with multimodal natural frequency distributions
- 2019** **SIAM Conference on Applications of Dynamical Systems**, Snowbird, UT, USA
Chaos and multistability in networks of coupled oscillators
- 2018** **Sydney Dynamics Group Workshop**, Blackheath, NSW, Australia
Collective chaos in networks of coupled oscillators
- 2018** **University of Sydney Applied Mathematics Seminar**, The University of Sydney, NSW, Australia
Chaos and the flow capture problem: Polluting is easy, cleaning is hard
- 2018** **SIAM Annual Meeting**, Portland, OR, USA
Polluting is easy, cleaning is hard: The challenge of flow heterogeneity for direct air capture of CO₂
- 2017** **SIAM Conference on Applications of Dynamical Systems**, Snowbird, UT, USA
Annihilation of periodic points and barriers to transport by discontinuous slip deformations in a fluid flow
- 2015** **Dynamics Days Europe Conference**, University of Exeter, UK
Mixing of Discontinuously Deforming Media
- 2015** **Department of Mechanical Engineering Seminar**
Department of Physics Seminar
Eindhoven University of Technology, Netherlands
Lagrangian transport in a 3D chaotic flow

- 2015** **Groundwater Group Seminar**, Institute of Environmental Assessment and Water Research (IDAEA-CSIC), Barcelona, Spain
Chaotic advection: mixing in a 3D porous media flow
- 2015** **Monash Fluids Seminar**, Monash University, VIC, Australia
Chaotic advection: mixing in a 3D porous media flow
- 2014** **19th Australasian Fluid Mechanics Conference**, RMIT University, VIC, Australia
Coherent Structures in a 3D Chaotic Potential Flow
- 2013** **CSIRO Computational Informatics Divisional Conference**, Gold Coast, QLD, Australia
Chaotic Advection in a 3D Volume-preserving Potential Flow
- 2012** **18th Australasian Fluid Mechanics Conference**, Australian Maritime College, The University of Tasmania, TAS, Australia
Chaotic Advection in a 3D Volume-preserving Potential Flow

Conference, Workshop and Seminar Organisation

- 2019 – 2020** **Sydney Dynamics Group Seminar Series**
- 2019** **SIAM Conference on Applications of Dynamical Systems**, Snowbird, UT, USA
Organised a minisymposium with 8 speakers on “Collective behavior in networks”
- 2014** **Monash Mechanical Engineering Graduate Association Student Conference**, Monash University, VIC, Australia. Organised inaugural conference.

Teaching Experience

- 2019** **Lecturer and course coordinator, The University of Sydney, NSW, Australia**
MATH1014: Introduction to linear algebra
- 2009 – 2015** **Tutor: Pure and Applied Mathematics, Monash University, VIC, Australia**
ENG1005: Engineering mathematics
MTH1020: Analysis of change
MTH1030: Techniques for modeling
MTH1112: Numbers, logic, and graphs
MTH2021: Linear algebra with applications
MTH2010: Multivariable calculus
MTH3121: Algebra and number theory I
MTH3150: Algebra and number theory II
MTH3060: Advanced ODE’s
MTH3020: Complex analysis and integral transforms
MTH3140: Real analysis

Supervising Experience

- 2019 – present** **Co-supervisor of Wenqi Yue (Masters) at the University of Sydney**
- 2019/2020** **Vacation Research Scholarship supervisor**
Supervisor for two projects in summer 2019/2020

Programming Skills

MATLAB, Mathematica, Fortran, C++

Academic and Research Awards

2019	Australian Mathematical Sciences Institute (AMSI) funding for a Vacation Research Scholarship
2015	Monash University Postgraduate Travel Grant Award
2015	Dynamics Days Europe Travel Bursary
2012	CSIRO PhD Top-up Scholarship
2012	Monash Graduate Scholarship
2010	Australian Postgraduate Award
2010	The University Medal for Undergraduate Academic Excellence (Monash University)
2009	Monash University Honours Pure Mathematics Prize
2009	Monash University Jubilee Honours Scholarship
2007	Monash University Science Scholarship