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Research Interests

My present research interests include the following topics:

Wave Turbulence

Optical wave turbulence

Gravitational wave turbulence in cosmology

Strong wave turbulence

Quantum and Superfluid Turbulence

Vortex dynamics

Analogies to classical turbulence flows

Kelvin waves

2D and Geophysical Fluid Dynamics

Structure and formation of large-scale mean flows

Turbulent statistics

Nonlinear Optics

Soliton and optical vortex formation

Modulational instability

Soliton turbulence

Those interested in pursuing a research project in one of these areas may contact me and may also consider applying for one of the following postdoctoral research fellowships:

Marie Skłodowska-Curie Research Fellowship: 2 to 3 years funding

EPSRC Postdoctoral Fellowship: 3 years funding for research in designated 'priority area'

Leverhulme Early Career Fellowship: 3 years funding for those with a UK degree

Newton International Fellowship: 2 years funding for non-UK citizens and who are not currently working in the UK

Qualifications

PhD, Ph.D. in Mathematics, University of Warwick
2006 → 2010
Award Date: 24 Jan 2011

Employment

School of Computer Science and Digital Technologies

College of Engineering and Physical Sciences

1 Sept 2023 → present

Aston Fluids Group

College of Engineering and Physical Sciences

18 Jan 2024 → present

College of Engineering and Physical Sciences

Birmingham, United Kingdom

1 Mar 2016 → present

Senior Lecturer

Applied Mathematics & Data Science

College of Engineering and Physical Sciences

1 Sept 2023 → present

Research output

An effective semilocal model for wave turbulence in two-dimensional nonlinear optics

Skipp, J., Laurie, J. & Nazarenko, S. V., 26 Jul 2023, In: Proceedings of the Royal Society of London A. 479, 2275, 22 p., 20230162.

Vorticity Locking and Pressure Dynamics in Finite-Temperature Superfluid Turbulence

Laurie, J. & Baggaley, A. W., 9 May 2023, In: Physical Review Fluids. 8, 5, 19 p., 054604.

Hamiltonian Derivation of the Point Vortex Model from the Two-Dimensional Nonlinear Schrödinger Equation

Skipp, J., Laurie, J. & Nazarenko, S., 24 Feb 2023, In: Physical Review E. 107, 2, 9 p., 025107.

Dipole dynamics in the point vortex model

Lydon, K., Nazarenko, S. & Laurie, J., 31 Aug 2022, In: Journal of Physics A: Mathematical and Theoretical. 55, 38, 31 p., 385702.

A plausible model of inflation driven by strong gravitational wave turbulence

Galtier, S., Laurie, J. & Nazarenko, S., 16 Jul 2020, In: Universe. 6, 7, 16 p., 98.

Coarse-grained pressure dynamics in superfluid turbulence

Laurie, J. & Baggaley, A. W., 28 Jan 2020, In: Physical Review Fluids. 5, 1, 014603.

Random transitions in stochastic turbulent flows

Bouchet, F., Laurie, J., Simonnet, E. & Zaboronski, O., 2020.

Protein lipograms

Laurie, J., Chattopadhyay, A. K. & Flower, D. R., 7 Oct 2017, In: Journal of Theoretical Biology. 430, p. 109-116 8 p.

Jets or vortices - what flows are generated by an inverse turbulent cascade?

Frishman, A., Laurie, J. & Falkovich, G. E., 29 Mar 2017, In: Physical Review Fluids. 2, 3, 8 p., 032602(R) .

A note on the propagation of quantized vortex rings through a quantum turbulence tangle: energy transport or energy dissipation?

Laurie, J. & Baggaley, A. W., Jul 2015, In: Journal of Low Temperature Physics. 180, 1-2, p. 95-108 14 p.

Reconnection dynamics and mutual friction in quantum turbulence

Laurie, J. & Baggaley, A. W., Jul 2015, In: Journal of Low Temperature Physics. 180, 1-2, p. 82-94 13 p.

Computation of rare transitions in the barotropic quasi-geostrophic equations

Laurie, J. & Bouchet, F., 15 Jan 2015, In: New Journal of Physics. 17, 1, 25 p., 015009.

Thermal counterflow in a periodic channel with solid boundaries

Baggaley, A. W. & Laurie, J., Jan 2015, In: Journal of Low Temperature Physics. 178, 1-2, p. 35-52 18 p.

Universal profile of the vortex condensate in two-dimensional turbulence

Laurie, J., Boffetta, G., Falkovich, G., Kolokolov, I. & Lebedev, V., 17 Dec 2014, In: *Physical Review Letters*. 113, 25, 5 p., 254503.

Langevin dynamics, large deviations and instantons for the quasi-geostrophic model and two-dimensional Euler equations

Bouchet, F., Laurie, J. & Zaboronski, O., Sept 2014, In: *Journal of Statistical Physics*. 156, 6, p. 1066-1092 22 p.

Kelvin-wave cascade in the vortex filament model

Baggaley, A. W. & Laurie, J., 9 Jan 2014, In: *Physical Review B*. 89, 1, 5 p., 014504.

Vortex-density fluctuations, energy spectra, and vortical regions in superfluid turbulence

Baggaley, A. W., Laurie, J. & Barenghi, C. F., 14 Nov 2012, In: *Physical Review Letters*. 109, 20, 5 p., 205304.

One-dimensional optical wave turbulence: experiment and theory

Laurie, J., Bortolozzo, U., Nazarenko, S. & Residori, S., May 2012, In: *Physics Reports*. 514, 4, p. 121-175 55 p.

Exact solution for the energy spectrum of Kelvin-wave turbulence in superfluids

Boué, L., Dasgupta, R., Laurie, J., L'vov, V., Nazarenko, S. & Procaccia, I., 23 Aug 2011, In: *Physical Review B*. 84, 6, 10 p., 064516.

Control and instanton trajectories for random transitions in turbulent flows

Bouchet, F., Laurie, J. & Zaboronski, O., 1 Jan 2011, In: *Journal of Physics: Conference Series*. 318, SECTION 2, 022041.

On the statistical mechanics of the 2D stochastic Euler equation

Bouchet, F., Laurie, J. & Zaboronski, O., 1 Jan 2011, In: *Journal of Physics: Conference Series*. 318, SECTION 4, 042020.

Interaction of Kelvin waves and nonlocality of energy transfer in superfluids

Laurie, J., L'vov, V. S., Nazarenko, S. & Rudenko, O., 26 Mar 2010, In: *Physical Review B*. 81, 10, 14 p., 104526.

Optical wave turbulence and wave condensation in a nonlinear optical experiment

Laurie, J., Bortolozzo, U., Nazarenko, S. & Residori, S., 2010, *Localized states in physics: solitons and patterns*. Descalzi, O., Clerc, M. G., Residori, S. & Assanto, G. (eds.). Berlin (DE): Springer, p. 67-87 21 p.

Optical wave turbulence and the condensation of light

Bortolozzo, U., Laurie, J., Nazarenko, S. & Residori, S., 1 Dec 2009, In: *Journal of the Optical Society of America B*. 26, 12, p. 2280-2284 5 p.

Modeling Kelvin wave cascades in superfluid helium

Boffetta, G., Celani, A., Dezzani, D., Laurie, J. & Nazarenko, S., Sept 2009, In: *Journal of Low Temperature Physics*. 156, 3-6, p. 193-214 22 p.

Activities

EPSRC Early Career Forum (External organisation)

Jason Laurie (Member)
1 Dec 2018

United Kingdom Fluids Network (UKFN) (External organisation)

Jason Laurie (Chair)
1 Mar 2017 → 1 Mar 2020

EPSRC Peer Review College (External organisation)
Jason Laurie (Member)
2016