CURRICULUM VITAE
Yue-Kin Tsang

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Education

- Ph.D., Physics, University of Maryland, College Park, August 2004
  Thesis: *Two-Dimensional Turbulence with Drag*
  Advisor: Prof. Edward Ott
- M.Phil., Physics, The Chinese University of Hong Kong, July 1996
  Thesis: *Fluctuation Statistics of Scalar Advected by Different Prescribed Velocity Fields*
  Advisor: Prof. Emily S.C. Ching
- B.Eng. (Hon.), Electronic Engineering, The Chinese University of Hong Kong, July 1994
  Thesis: *Fluorination of* $YBa_2Cu_3O_{7-\delta}$.
  Advisor: Prof. S.P. Wong

Employment

- Associated Research Fellow, February 2015 — present
  Department of Mathematics, University of Exeter
- Research Assistant, September 2013 — January 2015
  School of Mathematics, University of Edinburgh
- Research Fellow, September 2011 — August 2013
  School of Mathematics and Statistics, University of St Andrews
- Research Associate, August 2010 — August 2011
  Department of Physics, The Chinese University of Hong Kong
- Postdoctoral Fellow, September 2006 — June 2010
  Scripps Institution of Oceanography, University of California, San Diego
- Postdoctoral Fellow, January 2005 — August 2006
  Courant Institute of Mathematical Sciences, New York University
- Research Associate, September 2004 — December 2004
  Institute for Research in Electronics and Applied Physics, University of Maryland, College Park
- Full-Time Research Assistant, September 1996 — July 1998
  Department of Electronic and Information Engineering, The Hong Kong Polytechnic University

Other Experience and Training

- The Hong Kong Institution of Engineers *Structured Training Under Supervision* (a requirement for the IEE Chartered Engineer Qualification): a two-month training course on practical techniques in electrical and mechanical engineering. (Summer 1991)

Grants and Awards

- *Particle diffusion and dispersion in magnetohydrodynamic turbulence* (2016)
  High performance computing resources awarded by the PRACE Distributed European Computing Initiative (DECI), 13,500,000 core-hours

- *Rainfall variability in a changing climate: stochastic versus deterministic dynamics* (2015)
  Principal Investigator of the Feasibility Grant awarded by the EPSRC Network: Research on Changes of Variability and Environmental Risk, £15,609 (co-investigators: Geoffery Vallis and Jacques Vanneste)

- *Intermittency and multifractality in two-dimensional turbulence with drag* (2004)
  Best Poster Award, 1st Place, International Conference on Chaos and Nonlinear Dynamics: Dynamics Days, Chapel Hill NC, USA

Outreach Activities

- Maryland Day – annual open day of the University of Maryland (2003)

- Volunteer at the University of Maryland Observatory: biweekly Open House (2002-2004), New Telescope Owners Nights (2003), Mars Opposition (2003) , Venus Transit (2004)

- Dundee Science Festival – Family Fun Days (2011)

- Fife Science Festival – Science Discovery Day (2012)

- Lecturing at the Exeter Maths School Year 10 Summer Mathematics Residential (2015)

Professional Services

- Reviewer for Hong Kong Research Grants Council, Journal of Fluid Mechanics, Physics of Fluids, Journal of Geophysical & Astrophysical Fluid Dynamics, Physical Review Letters, Physical Review E and IEEE Transactions on Biomedical Engineering

Publications

1. Passive scalar conditional statistics in a model of random advection
   Emily S.C. Ching and Y.K. Tsang, *Phys. Fluids* **9**, 1353 (1997)

2. Intermittency of a passive scalar advected by a quasifrozen velocity field
   Emily S.C. Ching, C.S. Pang, Y.K. Tsang and X.H. Wang, *Phys. Fluids* **11**, 2263 (1999)

3. Nondestructive determination of the longitudinal chromatic dispersion distribution along an optical fiber
   P.K.A. Wai, F. Moldoveanu, H.H. Chen and Y.K. Tsang, *Microw. Opt. Technol. Lett.* **30** (5), 312 (2001)

4. Exponential decay of chaotically advected passive scalars in the zero diffusivity limit
   Yue-Kin Tsang, Thomas M. Antonsen, Jr., Edward Ott, *Phys. Rev. E* **71**, 066301 (2005)

5. Intermittency in two-dimensional turbulence with drag
   Yue-Kin Tsang, Edward Ott, Thomas M. Antonsen, Jr., Parvez N. Guzdar, *Phys. Rev. E* **71**, 066313 (2005)

6. Bounding biomass in the Fisher equation
   Daniel Birch, Yue-Kin Tsang and William .R. Young, *Phys. Rev. E* **75**, 066304 (2007)
   (Also selected to appear in *Virtual Journal of Biological Physics Research* **13**, June 15, 2007, Issue 12)

7. Multifractality and scale invariance in human heartbeat dynamics
   Emily S.C. Ching and Yue-Kin Tsang, *Phys. Rev. E* **76**, 041910 (2007)
   (Also selected to appear in *Virtual Journal of Biological Physics Research* **13**, November 1, 2007, Issue 14)

8. Near-inertial parametric subharmonic instability
   William R. Young, Yue-Kin Tsang and Neil J. Balmforth, *J. Fluid Mech.* **607**, 25 (2008)

9. Energy-enstrophy stability of β-plane Kolmogorov flow with drag
   Yue-Kin Tsang and William R. Young, *Phys. Fluids* **20**, 084102 (2008)

10. Forced-dissipative two-dimensional turbulence: a scaling regime controlled by drag
Yue-Kin Tsang and William R. Young, *Phys. Rev. E* **79**, 045308(R) (2009)

11. Predicting the evolution of fast chemical reactions in chaotic flows
Yue-Kin Tsang, *Phys. Rev. E* **80**, 026305 (2009)

12. Non-universal velocity probability densities in forced two-dimensional turbulence: the effect of large-scale dissipation
Yue-Kin Tsang, *Phys. Fluids* **22**, 115102 (2010)

13. Scaling behavior in turbulent Rayleigh-Bénard convection revealed by conditional structure functions
Emily S. C. Ching, Yue-Kin Tsang, T. N. Fok, Xiaozhou He and Penger Tong, *Phys. Rev. E* **87**, 013005 (2013)

14. Ellipsoidal vortices in rotating stratified flows: beyond the quasi-geostrophic approximation
Yue-Kin Tsang and David G. Dritschel, *J. Fluid Mech.* **762**, 196 (2015)

15. The effect of coherent stirring on the advection–condensation of water vapour
Yue-Kin Tsang and Jacques Vanneste, *Proc. R. Soc. A* **473**, 20170196 (2017)

16. Parametrization of stochastic effects in coarse-grained advection–condensation models
Yue-Kin Tsang and Geoffrey Vallis, *J. Atmos. Sci.*, submitted (2017)

17. Extended energy–enstrophy stability and anti-turbulence in two-dimensional hydrodynamics
Yue-Kin Tsang, in preparation (2017)

18. Multifractal measures of chaotically mixed passive scalars
Amir Ali Ahmadi, Yue-Kin Tsang, Edward Ott and Thomas M. Antonsen, Jr., in preparation (2017)

19. Particle diffusion in field-guided magnetohydrodynamic turbulence
Yue-Kin Tsang and Joanne Mason, in preparation (2017)

Conference Presentations

1. Novel Chromatic Dispersion Determination Along an Optical Fiber
The Pacific Rim Conference on Laser and Electro-Optics, Chiba, Japan, 1997

2. Two-Dimensional Turbulence with Drag: Wavenumber Energy Spectrum and Intermittency
International Conference on Chaos and Nonlinear Dynamics: Dynamics Days, Baltimore MD, USA, 2002

3. Intermittency and Multifractality in Two-Dimensional Turbulence with Drag
International Conference on Chaos and Nonlinear Dynamics: Dynamics Days, Chapel Hill NC, USA, 2004

4. Effective Diffusivities in a Two-layer, Isopycnal, Wind-driven Basin Model
MIT Meeting on Eddies and Ocean Circulation, Cambridge MA, USA, 2005

5. Planktonic Population in a Spatially Variable Environment
International Conference on Chaos and Nonlinear Dynamics: Dynamics Days, Bethesda MD, USA, 2006

6. Fractal Patterns in Chaotic Fluid Mixing
International Conference on Chaos and Nonlinear Dynamics: Dynamics Days, Bethesda MD, USA, 2006

7. A Test of Local Effective Diffusivity Parameterization in a Two-Layer, Wind-Driven Isopycnal Primitive Equation Model
American Geophysical Union Ocean Sciences Meeting, Honolulu HI, USA, 2006

8. Exponential Decay of Chaotically Advected Passive Scalars in the Zero Diffusivity Limit
6th Understanding Complex Systems Symposium, Urbana-Champaign IL, USA, 2006

9. Multifractality in Detrended Human Heart Beat Increment
International Conference on Chaos and Nonlinear Dynamics: Dynamics Days, Boston MA, USA, 2007

10. Enstrophy-constrained Stability Analysis of β-plane Kolmogorov Flow with Drag
American Physical Society March Meeting, New Orleans LA, USA, 2008

11. Energy-Enstrophy Stability of β-plane Kolmogorov Flow with Drag
Workshop on Nonlinear Processes in Oceanic and Atmospheric Flows, Castro-Urdiales, Cantabria, Spain, 2008

12. Energy Injection into Two-dimensional Turbulence: a Scaling Regime Controlled by Drag
American Physical Society Division of Fluid Dynamics 61st Annual Meeting, San Antonio TX, USA, 2008

13. What Determines the Progress of Fast Chemical Reactions in Chaotic Flows?
International Conference on Chaos and Nonlinear Dynamics: Dynamics Days, San Diego CA, USA, 2009

14. Scaling of Energy Injection Rate in Two-dimensional Turbulence with Drag
Gordon Research Conference on Nonlinear Science, South Hadley MA, USA 2009

15. Fast Chemical Reactions in Chaotic Flows: Predicting the Product Growth Rate
American Physical Society Division of Fluid Dynamics 62nd Annual Meeting, Minneapolis MN, USA, 2009

16. Fast Chemical Reactions in Chaotic Flows: Reaction Rate and Mixdown Time
IMA Annual Program Year Workshop: Transport and Mixing in Complex and Turbulent Flows, Minneapolis MN, USA, 2010

17. Revealing Small-scale Structures in Turbulent Rayleigh-Bénard Convection
The 25th Scottish Fluid Mechanics Meeting, Edinburgh, Scotland, UK, 2012

18. Ellipsoidal Vortices in Non-hydrostatic Rotating Stratified Flows: Can They Survive?
IUGG Conference on Mathematical Geophysics, Edinburgh, Scotland, UK, 2012

19. Ellipsoidal Vortices Beyond the Quasi-geostrophic Approximation
American Physical Society Division of Fluid Dynamics 65th Annual Meeting, San Diego CA, USA, 2012

20. Ageostrophic Effects on the Evolution of Ellipsoidal Vortices
IUTAM Symposium on Vortex Dynamics: Formation, Structure and Function, Fukuoka, Japan, 2013

21. Improving Global Stability Analysis of Kolmogorov Flows Using Enstrophy
British Applied Mathematics Colloquium, Leeds, England, UK, 2013

22. An Energy–enstrophy Method for Global Stability in Two-dimensional Hydrodynamics
Turbulent Mixing and Beyond Workshop, ICTP, Trieste, Italy, 2014

23. Atmospheric Moisture Transport: Stochastic Dynamics of the Advection-condensation Equation
SIAM Conference on Nonlinear Waves and Coherent Structures, Cambridge, England, UK, 2014

24. Impact of Changes in the Hadley Circulation on Regional Rainfall
Maths Foresees Workshop, Leeds, England, UK, 2015

25. Particle Diffusion in Magnetohydrodynamic Turbulence
UKMHD Meeting, Newcastle, England, UK, 2015

26. Particle Diffusion in Magnetohydrodynamic Turbulence: Effects of a Guiding Magnetic Field
XXXV Dynamics Days Europe, Exeter, England, UK, 2015

27. Particle Diffusion in Strong Field-guided Magnetohydrodynamic Turbulence
American Physical Society Division of Plasma Physics 57th Annual Meeting, Savannah GA, USA, 2015

28. Advection–Condensation of Water Vapor with Coherent Stirring: a Stochastic Approach
American Physical Society Division of Fluid Dynamics 68th Annual Meeting, Boston MA, USA, 2015

29. Stochastic Modelling and Parametrization of Atmospheric Moisture Transport
Mathematics of Dispersion in the Environment, Birmingham, England, UK, 2016

30. Effects of a Guided-field on Particle Diffusion in Magnetohydrodynamic Turbulence
UKMHD Meeting, Glasgow, Scotland, UK, 2016

31. Parametrization of Stochastic Effects in an Advection-condensation Model
The 4th Annual CliMathNet Conference, Exeter, England, UK, 2016

32. Effects of a Guided-field on Particle Diffusion in Magnetohydrodynamic Turbulence
17th MHD Days, Göttingen, Germany, 2016

33. The Quest for Water Vapour Parametrization in Weather and Climate Models
BRIM Workshop: The Influence of Weather and Climate Variability on Water Resources Management, Exeter, England, UK, 2017

34. Probabilistic Parametrization of Condensation in Coarse-grained Moisture Transport Models
British Applied Mathematics Colloquium, Surrey, England, UK, 2017

Teaching Experience

- The Chinese University of Hong Kong

    1. Physics in Meteorology, Spring 2011
    lecturing and developing a new set of lecture notes (available online) for the one-semester course

- University of California, San Diego *(giving mini-lectures in discussion/tutorial classes)*

    1. Introduction to Applied Mathematics II, Winter 2008
    2. Introduction to Applied Mathematics II, Winter 2007

- New York University

    1. Geophysical Turbulence, Fall 2005
    delivering guest lectures on multiple-scale analysis, homogenization theory and eddy diffusion

- University of Maryland, College Park *(giving mini-lectures in discussion/tutorial classes, developing and grading quizzes, leading practical laboratory sessions and grading homework/exam)*

    1. Experimental Physics II: Electricity and Magnetism, Spring 2004
    2. General Physics II, Spring 2003
    3. Quantum Mechanics I (graduate level), Fall 2001
    4. Principles of Modern Physics, Spring 2001
    5. Intermediate Theoretical Methods, Spring 2001
    6. Chaotic Dynamics (graduate level), Spring 2000
    7. Intermediate Theoretical Methods, Spring 2000
    8. General Physics II, Fall 1999
    9. Principles of Physics II, Spring 1999
    10. Principles of Physics I, Fall 1998

- The Hong Kong Polytechnic University

    1. Corporate Communication Network, Spring 1997
    leading computer simulation lab sessions

- The Chinese University of Hong Kong *(giving mini-lectures in discussion/tutorial classes, leading practical laboratory sessions and grading homework/exam)*

    1. Mechanics, Spring 1996
    2. Mechanics, Fall 1995
    3. Perspective in Physics, Fall 1994

List of References

1. Prof. Edward Ott
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   University of Maryland
   College Park, MD 20742, USA
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   Email: edott@umd.edu

2. Prof. Thomas M. Antonsen, Jr.
   Institute for Research in Electronics and Applied Physics
   University of Maryland
   College Park, MD 20742, USA
   Phone: 1-301-405-1635
   Email: antonsen@umd.edu

3. Prof. William R. Young
   Scripps Institution of Oceanography
   University of California, San Diego, 0213
   9500 Gilman Drive, La Jolla, CA 92093-0213, USA
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   Email: wryoung@ucsd.edu

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   St Andrews, Fife, Scotland, KY16 9SS, UK
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5. Prof. Jacques Vanneste
   School of Mathematics
   University of Edinburgh
   James Clerk Maxwell Building, Edinburgh, EH9 3FD, UK
   Phone: 44 (0)131 650 6483
   Email: j.vanneste@ed.ac.uk

6. Prof. Geoffrey K. Vallis
   College of Engineering, Mathematics and Physical Sciences
   University of Exeter
   Harrison Building, North Park Road, Exeter, EX4 4QF, UK
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   Email: g.vallis@exeter.ac.uk

7. Prof. K. Shafer Smith
   Courant Institute of Mathematical Sciences
   New York University
   251 Mercer Street, New York, NY 10012, USA
   Phone: 1-212-998-3176
   Email: shafer@cims.nyu.edu

8. Prof. Emily S. C. Ching
   Department of Physics
   The Chinese University of Hong Kong
   Shatin, New Territories, Hong Kong
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   Email: ching@phy.cuhk.edu.hk

9. Dr. Joanne Mason
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Harrison Building, North Park Road, Exeter, EX4 4QF, UK
Phone: 44 (0)1392 726606
Email: j.mason@exeter.ac.uk

10. Prof. Ming-chung Chu, (reference for teaching)
Department of Physics
The Chinese University of Hong Kong
Shatin, New Territories, Hong Kong
Phone: 852-2609-6364
Email: mcchu@phy.cuhk.edu.hk