THOMAS PEACOCK

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RESEARCH INTERESTS : Nonlinear Dynamics; Fluid Dynamics; Experimental Methods; Applied Mathematics.

EDUCATION

D. Phil. Department of Physics, **Oxford University**, Oxford, England, 1998.

Thesis, entitled *Bifurcation phenomena in flows of a liquid crystal*, obtained under the supervision of Professor Tom Mullin and Sharp Labs of Europe Ltd. Investigated electrohydrodynamic and shear flow instabilities in a nematic liquid crystal, relating experimental results to low-dimensional dynamical models. Furthermore, studied the potential use of smectic liquid crystals in LCD technology.

B. Sc. Department of Physics, **The University of Manchester**, Manchester, England, 1994.

Broad curriculum, with chosen options in mathematical methods, electrodynamics and general relativity. Graduated with highest grade in the academic year.

EMPLOYMENT

2003–present Assistant Professor, **MIT**, Cambridge, MA.

Experimental research on Nonlinear Dynamics and Fluid Mechanics. Lectures in Dynamics and Control and Experimental Instrumentation.

2000–2003 Applied Mathematics Instructor, **MIT**, Cambridge, MA.

Experimental research on sedimentation and free surface flows. Lecturer for undergraduate course in nonlinear dynamics, and recitation instructor in calculus and differential equations.

1998–2000 Research Associate, College of Engineering, **University of Colorado**, Boulder, CO.

Designed and constructed every aspect of flow control experiment using microactuators. Established collaborations with professors in Mechanical Engineering, Computer Science and Applied Mathematics. Supervised undergraduate and graduate research on the project.

1990-1991 Research Student, **British Petroleum (BP)**, London, England.

Performed gas chromatography analysis of refinery gases and investigated replacements for lead in unleaded fuel.

RESEARCH GRANTS

2000–2003 Collaborator for NSF Information Technology Research Grant *An interactive experiment/numerical simulation system with applications in MEMS design.*
2004–2005 James Ferry Research Grant *A new approach to unsteady separation.*
2004–2005 Pappalardo Fellowship.
2005–2007 ONR NLIWI Program *Experimental investigations on nonlinear internal wave evolution and generation.*
2005–2006 Pappalardo Fellowship.

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AWARDS

2005 ARCO Career Development Chair (MIT).
1999 The American Physical Society Gallery of Fluid Motion Award.
1996 The Royal Society Physics Research in Britain Award.
1995 Domus Research Scholarship (Oxford University).
1994 Samuel Bright Research Scholarship (Manchester University).
1993 Hatfield Scholarship (Manchester University).

TEACHING EXPERIENCE

Dynamics — Course lecturer for courses *Nonlinear Dynamics II: Continuum Mechanics*, *Dynamics and Control* and *Advanced Dynamics* at MIT. The courses incorporates MATLAB and experiments into the curriculum. Teaching assistant at Oxford University for senior-level course *Chaos*, from the text by Strogatz. *Chaos in Fluid Dynamics* classes as part of engineering course at University of Colorado, and as an IAP mathematics lecture at MIT.

Fluid Dynamics — Teaching assistant at Oxford university for senior-level course *Viscous Flow*, from the text by Acheson.

Calculus — Recitation instructor at MIT, from the text by Simmons. Student assessment rating of 6.55 (on scale from 1-7).

Diff. Eqns. — Recitation instructor at MIT, from the text by Edwards & Penney. Student assessment rating of 6.72 (on scale from 1-7).

Experiments — Lab instructor for course *Experiment and Instrumentation* at MIT. Supervisor of undergraduate research projects at Oxford University, University of Colorado and MIT. *Experiments with fluids* lecture as an IAP mathematics lecture at MIT.

JOURNAL PUBLICATIONS

- "Optimizing diffusion-driven flow in a fissure"
  R. Heitz, T. Peacock & R. Stocker, to appear in *Phys. Fluids* (2006).
- "Visualization of nonlinear effects in reflecting internal wave beams"
  T. Peacock & A. Tabaei, *Phys. Fluids* **17**, 061702 (2005).
- "The stratified Boycott effect"
  T. Peacock, F. Blanchette & J. W. M. Bush, *Journal of Fluid Mechanics* **529**, 33 (2005).
- "The effect of rotation on conical wave beams in a stratified fluid"
  T. Peacock & P. Weidman, *Expts. Fluids* **39**, 32 (2005).
- "An experimental investigation of the angular dependence of diffusion-driven flow"
  T. Peacock, R. Stocker & J. Aristoff, *Physics of Fluids* **16**, 3503 (2004).
- "Micro-active control of a planar jet"
  T. Peacock, E. Bradley, J. R. Hertzberg & Y-C. Lee, *Expts. Fluids* **37**, 22 (2004).
- "The Boycott effect in magma chambers"
  F. Blanchette, T. Peacock & J. W. M. Bush, *Geophysical Research Letters* **31**, L05611 (2004).

- "Solder assembled large MEMS flaps for fluid mixing"
  Z. C. Ma, E. Bradley, T. Peacock, J. R. Hertzberg and Y. C. Lee, *IEEE Trans. Adv. Packaging* **26**, 268 (2003).
- "Homoclinic bifurcations in a liquid crystal flow"
  T. Peacock & T. Mullin, *Journal of Fluid Mechanics* **432**, 369 (2001).
- "The transition to turbulence in a microscopic fluid flow"
  T. Peacock & T. Mullin, Gallery of Fluid Motion in *Physics of Fluids* **12** (9), S8 (2000).
- "From low- to high-dimensional dynamics in a microscopic fluid flow"
  T. Peacock, D. J. Binks & T. Mullin, *Physical Review Letters* **82**, 1446 (1999).
- "Bifurcation phenomena in flows of a nematic liquid crystal"
  T. Peacock & T. Mullin, *International Journal of Bifurcations & Chaos* **9** (2), 427 (1999).
- "Instabilities in a liquid crystal subject to oscillatory shear"
  T. Mullin & T. Peacock, *Proceedings of the Royal Society of London A* **455**, 2635 (1999).

CONFERENCE PUBLICATIONS

- "Experimental validation of the kinematic theory of unsteady separation"
  T. Peacock, R. Coral & G. Haller, *AIAA-2005-4093* (2005).
- "Solder assembled MEMS flaps to enhance fluid mixing"
  Z. Ma, T. Peacock, E. Bradley & Y. C. Lee, *Proceedings of ASME IMECE* (2001).
- "Sil'nikov chaos in fluid flows"
  T. Mullin, A. Juel & T. Peacock, in *New Concepts in Turbulence* (ed. C. Vassilicos), CUP (2000).
- "MTBE & TAME : The route to unleaded fuel."
  C. P. Haelsig, R. Gregory & T. Peacock, *Proceedings 150th meeting of Roy. Soc. of Chem.* (1991).

SELECTED TALKS

"Experimental investigations of unsteady separation"

June, 2005 *GRC on Nonlinear Dynamics*, Colby College, ME.
June, 2005 *AIAA meeting*, Toronto, CA.
May, 2005 *SIAM Dynamical Systems meeting*, Snowbird, UT.
Nov, 2004 *APS DFD Annual Meeting*, Seattle, WA.

"Rotating and reflecting internal wave beams"

Nov, 2005 *APS DFD Annual Meeting*, Chicago, IL.
Aug, 2005 *ONR NLIWI meeting*, San Francisco, CA.
Mar, 2005 *IMACS Nonlinear Waves*, Athens, Georgia.
Aug, 2004 *IUTAM 04*, Warsaw, Poland.

"Diffusion driven flows"

Nov, 2003 *APS DFD Annual Meeting*, New York, NY.

"The stratified Boycott effect"

Nov, 2002 *APS DFD Annual Meeting*, Dallas, TX.

"Active control of a jet using MEMS"

May, 2002 *Mechanical Engineering Seminar*, UCSB, CA.
Mar, 2002 *Mechanical Engineering Seminar*, UCLA, CA.
Nov, 2001 *APS DFD Annual Meeting*, San Diego, CA.

"Micro-active control of a planar jet"

Nov, 1999 *APS DFD Annual Meeting*, New Orleans, LA.
May, 1999 *SIAM Dynamical Systems Meeting*, Snowbird, UT.

"The transition to turbulence in a liquid crystal"

Mar, 1998 *Applied Mathematics Seminar*, University of Colorado, Boulder, CO.
Feb, 1997 *Nonlinear Systems Seminar*, Manchester University, England.
Sep, 1996 *Int. Conf. on Nonlinearity, Bifurcations & Chaos*, Lodz, Poland.