

# Stephen Lynch

## PERSONAL DETAILS

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Date of Birth: 02/05/64

Marital Status: Married

Nationality: British

Place of Birth: Liverpool, England

## UNIVERSITY EDUCATION

- 1982-1988 University College of Wales, Aberystwyth.  
Department of Mathematics.
- 1985-1988 PhD awarded July 1988.  
Bifurcation of limit cycles in systems of Liénard type.  
Supervisor: Professor N.G. Lloyd.  
External Examiner: Professor J. Mawhin, Louvain, Belgium.
- 1982-1985 BSc Single Honours in Pure Mathematics. Grade II(i).

## PROFESSIONAL MEMBERSHIP

- 1991-present Member of the London Mathematical Society.
- 2007-present Member of the National Centre for the Excellence in Teaching Mathematics  
Registered with the Maths, Stats and Operational Research HERA.

## REFeree FOR THE ORGANISATIONS

Institute of Physics, London Mathematical Society and Mathematical Reviews.

## CAREER TO DATE

- 1991-present Manchester Metropolitan University.  
Department of Computing and Mathematics.  
Senior Lecturer from 1995.
- 2007-present The Open University  
Associate Lecturer
- 1988-1991 Southampton University.  
Faculty of Mathematical Studies.  
Temporary Lecturer.

## TEACHING EXPERIENCE

- 1988-present Foundation Mathematics (Level 0)  
Calculus, Fractals, Discrete Mathematics, Geometry (Level 1)  
Engineering Mathematics, Linear Algebra and Analysis (Level 2)  
Dynamical Systems (Level 3)  
Symbolic Computation, Chaos and Simulation (Level 3)  
Nonlinear Dynamics and Chaos, Dynamical Models in Biology (MSc Units)

## UNDERGRADUATE PROJECT SUPERVISION

1991-present I have supervised over 40 final year undergraduate projects. Two students were awarded the Henry McDonnell memorial prize for the best project amongst universities in the North West of England. One student and I had a paper published in the International Journal of Bifurcation and Chaos in 2002.

## PHD PROJECT SUPERVISION

1994-1999 Second Supervisor: Particulate Filler Morphology and its Effect on the Processing and Properties of Polymer/Filler Composites.  
2010-2013 Second Supervisor: A Multidisciplinary Solution to Combat Pin Tract Infections.

## PERSONAL ACHIEVEMENTS

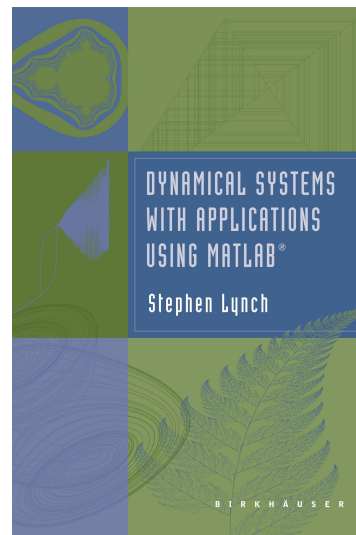
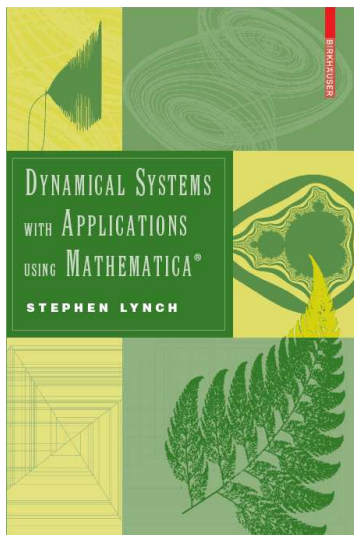
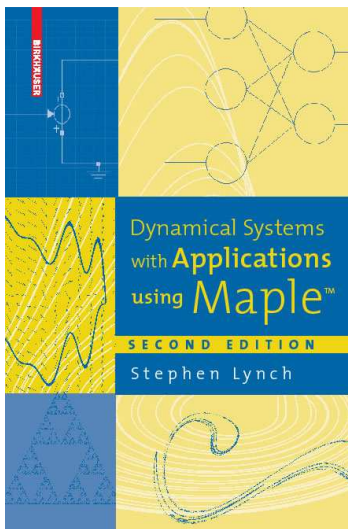
2010 Fourth book 'Dynamical Systems with Applications using Maple 2<sup>nd</sup> Ed.' published by Springer/ Birkhäuser in January 2010.

2009 Nominated for a National Teaching Fellowship by MMU.

2007 Nominated for a National Teaching Fellowship by MMU.

Third book 'Dynamical Systems with Applications using Mathematica' published by Springer/ Birkhäuser in September 2007.

2004 Second book entitled 'Dynamical Systems with Applications using MATLAB', published by Birkhäuser in July 2004. M-files at <http://www.mathworks.com/matlabcentral/fileexchange> have been downloaded over 20,000 times. Please see reviews.



1988 Awarded the V.C. Morton Prize for my PhD thesis.

## RESPONSIBILITIES

- Subject Leader Part-Time Mathematics (1992-93)
- Stage One Tutor for the BSc(Hons) Combined Honours Course (1994-98): [450 Students].
- Foundation Tutor for Mathematics (2001- 2004): [500 Students].
- Programme Leader Mathematics Courses (2005 - ): [250 Students].
- Member of the Research, Publicity and Teaching and Learning Committees, respectively.
- Instrumental in establishing the Schools Liaison forum.

## PUBLICATIONS

### PATENT PENDING

1. Borresen J. and Lynch S., Binary Half Adder and other Logic Circuits, UK patent pending application number 1011110.2 (2010).

### BOOKS

1. Lynch S., Dynamical Systems with Applications using Maple® 2<sup>nd</sup> Ed., Birkhäuser/Springer, Boston (2010). ISBN: 0-8176-4389-3.

2. Lynch S., Dynamical Systems with Applications using Mathematica®, Birkhäuser/Springer, Boston (2007). ISBN 0-8176-4482-2.

3. Lynch S., Dynamical Systems with Applications using MATLAB®, Birkhäuser, Boston (2004). ISBN 0-8176-4321-4.

4. Lynch S., Dynamical Systems with Applications using Maple®, Birkhäuser, Boston (2001). ISBN 0-8176-4150-5.

### BOOK CHAPTERS

1. Lynch S., MATLAB® Programming for Engineers and Scientists, Applications of Nonlinear Dynamics and Chaos in Engineering, Santo Banerjee, Mala Mitra, Lamberto Rondoni (Eds.), Springer (2011) to appear.

2. Lynch S. and Steele A.L., Nonlinear Optical Fibre Resonators with Applications in Electrical Engineering and Computing, Applications of Nonlinear Dynamics and Chaos in Engineering, Santo Banerjee, Mala Mitra, Lamberto Rondoni (Eds.), Springer (2011) to appear.

3. Lynch S., Symbolic computation of Lyapunov quantities and the second part of Hilbert's sixteenth problem, Differential Equations with Symbolic Computation, Wang, Dongming; Zheng, Zhiming (Eds.), [Trends in Mathematics](#), Birkhäuser/Springer, 1-26 (2005), ISBN: 3-7643-7368-7.

### JOURNAL PUBLICATIONS (H-index 8 on Web of Science)

1. Lynch S. and Borresen J., Feedback in an inflation-unemployment model, to be submitted to J. of Math. Econ., (2010).

2. Borresen J. & Lynch S., Neuronal Computers, Nonlinear Anal. Theory, Meth. & Appl., **71**, 2372-2376 (2009).

3. Jiang J., Han M., Yu P. & Lynch S., Limit cycles in two types of symmetric Liénard systems, Int. J. of Bifurcation and Chaos, **17**(6), 2169-2174 (2007).

4. Mills S.L., Lees G.C., Liauw C.M., Rethon R.N. & Lynch S., Prediction of physical properties following the dispersion assessment of flame retardant filler/polymer composites based on the multifractal analysis of SEM images, J. Macromolecular Sci. B- Physics, **44**(6), 1137-1151 (2005).

5. Lynch S. & Bandar Z., Bistable neuromodules, Nonlinear Anal. Theory, Meth. & Appl., **63**(5-7), 669-677 (2005).

6. Lynch S., Analysis of a blood cell population model, Int. J. of Bifurcation and Chaos, **15**(7), 2311-2316 (2005).

7. Mills S.L., Lees G., Liauw C. & Lynch S., An improved method for the dispersion assessment of flame retardent filler/polymer systems based on the multifractal analysis of SEM images, *Macromolecular Materials and Engineering*, **289**(10), 864-871 (2004).
8. Mills S.L., Lees G., Liauw C. & Lynch S., Dispersion assessment of flame retardent filler/polymer systems using a combination of X-ray mapping and multifractal analysis, *Polymer Testing*, **21**(8), 941-948 (2002).
9. Borreson J. & Lynch S., Further investigation of hysteresis in Chua's circuit, *Int. J. of Bifurcation and Chaos*, **12**(1), 129-134 (2002).
10. Lynch S., Mutistability, bistability and chaos control, *Nonlinear Anal. Theory, Meth. & Appl.*, **47**(7), 4501-4512 (2001).
11. Lynch S. & Steele A.L., Controlling chaos in nonlinear bistable optical resonators, *Chaos, Solitons & Fractals*, **11**(5), 721-728 (2000).
12. Christopher C.J. & Lynch S., Small-amplitude limit cycles of Liénard equations with either quadratic or cubic damping or restoring terms, *Nonlinearity*, **12**(4), 1099-1112 (1999).
13. Lynch S. & Christopher C.J., Limit cycles in highly non-linear differential equations, *Journal of Sound and Vibration*, **224**(3), 505-517 (1999).
14. Lynch S., Generalized cubic Liénard equations, *Applied Math. Lett.*, **12**(2), 1-6 (1999).
15. Lynch S., Steele A.L. & Hoad J.E., Stability analysis of nonlinear optical resonators, *Chaos, Solitons & Fractals*, **9**(6), 935-946 (1998).
16. Lynch S., Generalized quadratic Liénard equations, *Applied Math. Lett.*, **11**(3), 7-10 (1998).
17. Lynch S., Liénard systems and the second part of Hilbert's sixteenth problem, *Nonl. Anal. Theory, Meth. and Appl.*, **30**(3), 1395-1403 (1997).
18. Ogusu K., Steele A.L., Hoad J.E. & Lynch S., Corrections to and comments on "Dynamic behaviour of reflection optical bistability in a nonlinear fibre ring resonator", *IEEE J. Quantum Electron.*, **33**(11), 2128-2129 (1997).
19. Steele A.L., Lynch S. & Hoad J.E., Analysis of optical instabilities and bistability in a nonlinear optical fibre loop mirror with feedback, *Optics Comm.*, **137**(1-3), 136-142 (1997).
20. Lynch S., Limit cycles of Generalized Liénard equations, *Applied Math. Lett.*, **8**(6), 15-17 (1995).
21. Lynch S., Small-amplitude limit cycles of the generalized mixed Rayleigh-Liénard oscillator, *Journal of Sound and Vibration*, **178**(5), 615-620 (1994).
22. Lynch S., More results on the bifurcation of limit cycles for systems of Liénard type, *J. Egypt. Math. Soc.*, **2**, 75-87 (1994).
23. Lynch S., Small-amplitude limit cycles of Liénard equations, *Calcolo*, **127**, Nos. 1-2, 1-32 (1990).
24. Lloyd N.G. & Lynch S., Small-amplitude limit cycles of certain Liénard systems, *Proc. Roy. Soc. Lond. Ser. A*, **418**, 199-208 (1988).

## CONFERENCE PROCEEDINGS

1. Steele A.L. & Lynch S, Chaos synchronization of a passive fibre resonator using the auxiliary system and applications to chaos masking, Nonlinear Guided Waves and Their Applications (Topical Meeting) on CD-ROM (The Optical Society of America, Washington, DC, 2004), CANADA MC15.
2. Lynch S., Dynamical models with feedback using Maple, Proceedings of the MSW 2002, Waterloo, CANADA (2002).
3. Lynch S. & Steele A.L., Controlling chaos in a simple nonlinear fibre resonator, Nonlinear Guided Waves and Their Applications, **5**, Technical Digest Series (Optical Society of America, Washington DC), 219-221, CANADA (1998).
4. Mills S.L., Liauw C., Lees G. & Lynch S., Assessment of filler dispersion using image analysis methods, Extended abstracts of the Euro-fillers '97 Conference, 259-262, MOFFIS and FILPLAS, Manchester, UK (1997).
5. Lynch S., Recent results on Liénard systems, Proceedings of the 6<sup>th</sup> Int. Coll. On Differential Equations, 151-157, ed. D. Bainov, Plovdiv, BULGARIA (1996).

## RECENT CONFERENCE INVITATIONS

2008 July	Florida, USA. Fifth World Congress of Nonlinear Analysts.
2008 July	Manchester, UK, Using Mathematica to Teach A-Level Mathematics.
2007 July	Oxford, UK, Mathematica Publishing Day, Oxford.
2006 November	Manchester, UK, Mathematica Conference.
2004 July	Florida, USA. Fourth World Congress of Nonlinear Analysts.
2002 July	Waterloo, Canada. Maple Summer Workshop.
2000 August	Catania, Sicily. Third World Congress of Nonlinear Analysts.
1999 August	University of Plymouth, Plymouth. The Fourth International Conference on Technology in Mathematics Teaching.
1999 January	Isaac Newton Institute, Cambridge. Workshop on Multifractals.
1998 April	Victoria, British Columbia, Canada. Nonlinear Guided Waves and Their Applications.
1996 July	Athens, Greece, The Second World Congress of Nonlinear Analysts.
1995 August	Plovdiv, Bulgaria. Sixth International Colloquium on Differential Equations.
1994 June	University of Birmingham. National Symposium. Sharing Innovative Practices, Teaching and Assessing Mathematics in Higher Education.

## **RESEARCH GRANTS**

1. Awarded early adopters grant (£5000) “Advanced mathematical modelling of muscle cross bridge kinetics as an aid to identifying molecular modifications” with Hans Degens (IRM, Health Sciences).
2. Co-applicant on PhD award (£50,000) “A multidisciplinary solution to combat pin tract infections” with Kathryn Whitehead as the Director of Studies.
3. Maple™, MATLAB® and Mathematica® software over 10 years and more (worth £30,000).

## **CONFERENCE and WORKSHOP ORGANIZATION**

In collaboration with Wolfram Research, I organized the first national workshop on “Using Mathematica to Teach A-Level Mathematics” held at MMU in summer 2008.

In collaboration with Adept Scientific, I organized the first national workshop on “Using Maple to Teach A-Level Mathematics” held at MMU in summer 2010.

Each year I run two “MATLAB for Postgraduate Study” workshops for the Dalton Research Institute at MMU.