

Jitse Niesen

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RESEARCH INTERESTS

- ★ **Numerical analysis** of ordinary differential equations, especially exponential integrators and geometric integration, and related methods for partial differential equations and numerical linear algebra, with application to financial mathematics.
- ★ **Applied dynamical systems**, especially the stability of travelling waves and Evans function computations.
- ★ **Symmetries of differential equations**, in connection with computer algebra.

EMPLOYMENT HISTORY

2010–now: **Lecturer**, University of Leeds, United Kingdom.
2007–2010: **RCUK Academic Fellow**, University of Leeds, United Kingdom.
2006–2007: **Research Assistant**, La Trobe University, Melbourne, Australia.
2003–2006: **Research Associate**, Heriot–Watt University, Edinburgh, United Kingdom.
2003: **Temporary Instructor**, International University Bremen, Germany (3 months).

EDUCATION

1999–2004: **PhD**, Applied Mathematics and Theoretical Physics, University of Cambridge, UK.
1993–1999: **ir**¹ (*cum laude*), Computer Science, University of Twente, the Netherlands.
1993–1998: **ir**¹ (*cum laude*), Applied Mathematics, University of Twente, the Netherlands.

¹The *ingénieur* degree (abbreviated *ir*) is a former Dutch degree, comparable to an MSc.

TEACHING EXPERIENCE

I have taught the following courses (*i.e.*, I delivered the lectures, wrote and marked the exam, and had overall responsibility):

- 2010, 2011: **Financial Mathematics I** (MATH1510) at the University of Leeds, UK.
A first-year course in the Mathematics and Finance programme, consisting of 33 lectures and 5 example classes. This was a new course and thus I had to design it myself within the specified curriculum. It was taken by about seventy students.
- 2010: **Mathematical Review** (MATH5310) at the University of Leeds, UK.
A course in the MSc Financial Mathematics programme which summarizes basic maths in preparation of the other courses in the programme. It consists of 10 half-day blocks and was taken by about thirty students.
- 2008: **Applications of mathematics** (MATH1351) at the University of Leeds, UK.
A first-year course in the Mathematics and Finance programme, covering vector algebra and difference equations. The course consists of 22 lectures. It was taken by about forty students.
- 2007: **Numerical analysis** (MAT3NA) at La Trobe University, Australia.
I shared responsibility for this third-year course for students in mathematics and computer science with two other lecturers. The part I was responsible for treated programming in Fortran 90. This part consisted of twelve lectures supplemented by computer labs.
- 2005: **Intermediate mathematics** (F1.1UM1) at Heriot-Watt University, UK.
A first-year course, taken by students from various disciplines in science and engineering. The course consists of 24 lectures and 8 tutorials.
- 2003: **Natural Sciences Laboratory, Mathematics Module III** (100123) at the International University Bremen, Germany.
A first-year course, introducing students in the School of Engineering and Science to Matlab. The course consists of four two-hour lectures, and four afternoons in the computer laboratory. Since this was the first time that the course was given, I had to design the course myself.

In addition, I supervise undergraduate project and am responsible for pastoral care at the University of Leeds. I also delivered tutorials and exercise classes from 1996 at the above universities, the University of Cambridge, UK, and the University of Twente, the Netherlands.

SUBMITTED MANUSCRIPTS

- ★ *A Krylov subspace method for pricing options* (with Will M. Wright).
Preprint SSRN 1799124, submitted for publication, 22 pages, 2011.

PEER-REVIEWED JOURNAL ARTICLES

- ★ *Algorithm 919: A Krylov subspace algorithm for evaluating the φ -functions appearing in exponential integrators* (with Will M. Wright).
ACM Trans. Math. Software, vol. 23, nr. 3, Article 22, 2012.
- ★ *A new class of symmetry reductions for parameter identification problems* (with Nicoleta Bîlă).
J. Nonlinear Math. Phys., vol. 16, nr. 3, pp. 355–371, 2009.
- ★ *Computing stability of multi-dimensional travelling waves* (with Veerle Ledoux, Simon Malham and Vera Thümmeler).
SIAM J. Appl. Dynam. Systems, vol. 8, nr. 1, pp. 480–507, 2009.
- ★ *Convergence of the Magnus series* (with Per Christian Moan).
J. Found. of Comp. Math., vol. 8, nr. 3, pp. 291–301, 2008.
- ★ *Evaluating the Evans function: Order reduction in numerical methods* (with Simon Malham).
Math. Comp., vol. 77, nr. 261, pp. 158–178, 2008.
- ★ *On a new procedure for finding nonclassical symmetries* (with Nicoleta Bîlă).
J. Symbolic Comput., vol. 38, nr. 6, pp. 1523–1533, 2004.
- ★ *A priori estimates for the global error committed by Runge–Kutta methods for a nonlinear oscillator*. *LMS J. Math. Comput.*, vol. 6, pp. 18–28, 2003.

OTHER PUBLICATIONS

- ★ *On the global error committed when evaluating the Evans function numerically*.
Technical report HWM 06-43, Dept of Mathematics, Heriot–Watt University. 22 pages, 2006.
- ★ *On the Global Error of Discretization Methods for Ordinary Differential Equations*.
PhD thesis, University of Cambridge, 2004.
- ★ *Automatic Generation and Differentiation of Partial Differential Equation Solvers with Index-Free Scripts*.
Master’s thesis, Dept of Computer Science, University of Twente, the Netherlands, 1999.
- ★ *The Generalized WDVV-System*.
Master’s thesis, Dept of Applied Mathematics, University of Twente, the Netherlands, 1998.

TALKS

- ★ *On the numerical computation of the modified energy.*
Foundations of Computational Mathematics (FoCM), Budapest, July 2011.
- ★ *The Evans function and the stability of travelling waves.*
Patterns, Nonl. Dyn. and Appl. (PANDA), University of Nottingham, UK, September 2010.
- ★ *The Evans function and the stability of travelling waves.*
Staff colloquium, Department of Mathematics, Universiteit Utrecht, Netherlands, May 2010.
- ★ *Krylov methods for the computation of matrix functions.*
Comput. Maths and Math. Biol. Seminar, Heriot–Watt University, Edinburgh, UK, March 2010.
- ★ *Computing the φ function of a matrix.*
SIAM Conference on Applied Linear Algebra, Monterey Bay-Seaside, USA, October 2009.
- ★ *Exponential integration of large systems of ODEs.*
Center for Computational Mathematics (CCoM) Seminars, UC San Diego, USA, October 2009.
- ★ *Exponential integration of large systems of ODEs.*
23rd Biennial Conference on Numerical Analysis, Glasgow, UK, June 2009.
- ★ *Exponential integrators using Krylov iteration.*
Internat. Conf. on Sci. Comput. and Diff. Equations (SciCADE), Beijing, China, May 2009.
- ★ *Computing the φ function of a matrix.*
Manifolds and Geometric Integration Colloquia (MaGIC), Hornsjø, Norway, March 2009.
- ★ *Stability Computations for Two-dimensional Fronts Using the Evans Function.*
Applied Nonlinear Dynamics Seminar, University of Leeds, UK, February 2009.
- ★ *Computing the φ function of a matrix.*
Num. Analysis & Sci. Comput. Seminar, University of Manchester, UK, December 2008.
- ★ *Stability Computations for Two-dimensional Fronts Using the Evans Function.*
SIAM Conference on Nonlinear Waves and Coherent Structures, Rome, Italy, August 2008.
- ★ *Exponential integrators using Krylov iteration.*
Inst. Comput. Maths & Sci./Eng. Comput., Chinese Acad. Sci., Beijing, China, May 2008.
- ★ *Exponential integrators for semi-discretized PDEs.*
Comput. Maths and Math. Biol. Seminar, Heriot–Watt University, Edinburgh, UK, May 2008.
- ★ *Exponential integrators for semi-discretized PDEs.*
Numerical Analysis Seminar, University of Bath, UK, March 2008.
- ★ *Exponential integrators using Krylov iteration.*
Manifolds and Geometric Integration Colloquia (MaGIC), Renon, Italy, February 2008.
- ★ *Solving partial differential equations with exponential integrators.*
Applied Mathematics Seminar, University of Leeds, UK, January 2008.
- ★ *Geometric integration methods for the computation of the Evans function.*
Internat. Conf. on Sci. Comput. and Diff. Equations (SciCADE), Saint Malo, France, July 2007.
- ★ *Stability computations for travelling waves using the Evans function.*
Theoretical Mechanics Seminar, University of Nottingham, UK, June 2007.
- ★ *Evans function calculations for a two-dimensional system.*
SIAM Conference on Applications of Dynamical Systems, Snowbird, UT, USA, May 2007.

TALKS (CONTINUED)

- ★ *On the convergence of the Magnus series.*
Castellón Conference on Geometric Integration, Spain, September 2006.
- ★ *Geometric integration methods for the computation of the Evans function.*
Innovative Integrators for Diff. and Delay Equations, Innsbruck, Austria, September 2006.
- ★ *On the convergence of the Magnus series.*
Num. Solution of Diff. and Diff.-Alg. Equations (NUMDIFF), Halle, Germany, September 2006.
- ★ *Stability computations for travelling waves using the Evans function.*
13th Biennial Comput. Techn. and Applic. Conf. (CTAC), Townsville, Australia, July 2006.
- ★ *Stability of travelling waves using the Evans function.*
Industrial and Appl. Maths Seminar, Heriot-Watt University, Edinburgh, UK, February 2006.
- ★ *Stability computations for travelling waves using the Evans function.*
21st Biennial Conference on Numerical Analysis, Dundee, UK, June 2005.
- ★ *Order reduction in stability computations using the Magnus method.*
Internat. Conf. on Sci. Comput. and Diff. Equations (SciCADE), Nagoya, Japan, May 2005.
- ★ *The Evans function review. Part II: Numerical computations.*
Applied Analysis Seminar, University of Strathclyde, Glasgow, UK, April 2005.
- ★ *On the stability of the Magnus method.*
Manifolds and Geometric Integration Colloquia (MaGIC), Ustaoset, Norway, February 2005.
- ★ *The stability of travelling wave solutions of the Gray-Scott equation.*
Mathematics Colloquium, Heriot-Watt University, UK, January 2005.
- ★ *Computing the Evans function using the Magnus expansion.*
Manifolds and Geometric Integration Colloquia (MaGIC), Røros, Norway, March 2004.
- ★ *Stability analysis of travelling wave solutions using the Evans function.*
e-Science / Numerical Analysis Seminar, University of Durham, UK, February 2004.
- ★ *How to choose the step size when integrating an ODE.*
20th Biennial Conference on Numerical Analysis, Dundee, UK, June 2003.
- ★ *Optimizing the step size subject to a bound on the global error.*
Manifolds and Geometric Integration Colloquia (MaGIC), Rondablikk, Norway, February 2003.
- ★ *Optimizing the step size of numerical integrators.*
Foundations of Computational Mathematics (FoCM), Minneapolis, USA, August 2002.
- ★ *Optimizing the step size of numerical integrators.*
X-th Summer School in Numerical Analysis, Durham, UK, July 2002.
- ★ *Optimal step size functions for numerical integrators.*
University of Tübingen, Germany, April 2002.
- ★ *On the global error committed by numerical integrators on nonautonomous oscillators.*
Manifolds and Geometric Integration Colloquia (MaGIC), Ustaoset, February 2002.
- ★ *A priori estimates for the global error of ODE solvers.*
19th Biennial Conference on Numerical Analysis, Dundee, UK, June 2001.
- ★ *On the global error committed by numerical integrators.*
Numerical Analysis Seminar, University of Cambridge, UK, February 2001.

PRIZES AND AWARDS

- 2010: Scheme 2 (Visits to the UK) Grant from the London Mathematical Society.
- 2009: International Travel Grant from the Royal Society.
- 2001: Rayleigh–Knight prize, University of Cambridge.
- 1999: Scholarship from VSB Bank, the Netherlands.
- 1999: Scholarship from Talent Program, Dutch Ministry of Education.
- 1998: Prize in Dutch–Flemish Universities’ Mathematics Competition.
- 1996: Prize in Dutch Universities’ Mathematics Competition.
- 1993: Bronze medal at International Mathematics Olympiad, Turkey.
- 1992: Second place at Dutch Mathematics Olympiad.

MISCELLANEOUS

- ★ **Referee** for 11 journals: *ANZIAM J.*, *Appl. Numer. Math.*, *BIT*, *IMA J. Numer. Anal.*, *Internat. J. Comput. Math.*, *J. Found. Comput. Math.*, *Numer. Algorithms*, *Phys. D*, *Proc. Edinb. Math. Soc.*, *SIAM J. Matrix Anal. Appl.* and *SIAM J. Numer. Anal.*
- ★ **Languages:** Dutch (native), English (fluent), German (good), French (intermediate).
- ★ **Computer skills:** Maple, Mathematica, Matlab, Reduce;
programming in C, C++, Fortran 77/90, LISP, Python.