Dr. James Rankin

CONTACT INFORMATION	Center for Neural Science	Mobile:	+1 347 347 1314
	New York University	Fax:	+1 212 995 4011
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	USA		

CURRENT APPOINTMENT

New York University, Center for Neural Science, Rinzel Lab

- **Postdoctoral Fellow** — **October 2013–present**
  Supported by a Swartz Foundation postdoctoral research grant

PREVIOUS APPOINTMENTS

Inria Sophia-Antipolis, NeuroMathComp

- **Postdoctoral Fellow** — **September 2010–September 2013**
  Supported by the ERC-funded NERVI grant

University of Bristol, Department of Engineering Mathematics

- **Visiting Fellow** — **September 2010–September 2011**

- **Postdoctoral Fellow** — **June 2010–September 2010**
  Supported by the EPSRC-funded *Making it Real* grant

EDUCATION

University of Bristol, Department of Engineering Mathematics

- **PhD — Applied Mathematics** — **May 2010**
  - Thesis: *Bifurcation analysis of nonlinear ground handling of aircraft*
  - Defended with **no corrections and a faculty prize nomination**
  - Supervisors: Prof. Bernd Krauskopf, Dr. Mark Lowenberg, and Dr. Sanjiv Sharma (Airbus UK)
  - Funded by an EPSRC CASE award grant with Airbus in the UK
  - Work placements at Airbus, see Industrial Experience

- **MSc with Distinction — Industrial and Environmental Modelling** — **September 2006**
  - Thesis: *Crisis bifurcations in the Ikeda map*
  - Supervisor: Dr. Hinke Osinga
  - Courses in mathematical modelling, nonlinear dynamics, chaos, asymptotics, waves and instabilities

University of Bristol, Department of Mathematics

- **BSc Hons. — Mathematics** — **June 2005**
  - Thesis: *Fractal simulation of the magnetic pendulum*
  - Supervisor: Prof. Holger Waalkens
  - Courses in optimisation and linear programming, numerical methods, control theory, ordinary differential equations, partial differential equations

RESEARCH THEMES

Applications of mathematical modelling and numerical computation in the following areas:
- Nonlinear dynamics, bifurcation analysis and numerical continuation
- Cortical modelling of the auditory and visual systems
- Dynamics of perceptual switching in audition and vision
- Experiments in auditory perception (psychoacoustics)

AWARDS

- Airbus PhD Day 2009 - Presentation award
- MATHMOD 2009 - Academic poster award
- ECMI 2008 - Student poster award

JOURNAL
PUBLICATIONS

J. Rankin, E. Sussman and J. Rinzel, *Neuromechanistic model of auditory bistability*, PLOS Computational Biology, Vol. 11, No. e1004555, 2015

J. Rankin, D. Avitabile, J. Baladron, G. Faye and D. J. Lloyd, *Continuation of localised coherent structures in nonlocal neural field equations*, SIAM Journal on Scientific Computing (SISC), Vol. 36, No. 1, pp. B70–B93, 2014

J. Rankin, A. I. Meso, G. S. Masson, O. Faugeras and P. Kornprobst, *Bifurcation study of a neural fields competition model with an application to perceptual switching in motion integration*, Journal of Computational Neuroscience, Vol. 36, No. 2, pp. 193–213, 2014

G. Faye, J. Rankin and D.J. Lloyd, *Localized radial bumps of a neural field equation on the Euclidean plane and the Poincaré disk*, Nonlinearity, Vol. 26, pp. 437–478, 2013

J. Rankin, É. Tlapale, R. Veltz, O. Faugeras and P. Kornprobst, *Bifurcation analysis applied to a model of motion integration with a multistable stimulus*, Journal of Computational Neuroscience, Vol. 34, No. 1, pp. 103–124, 2013

G. Faye, J. Rankin and P. Chossat, *Localized states in an unbounded neural field equation with smooth firing rate function: a multi-parameter analysis*, Journal of Mathematical Biology, Vol. 66, No. 6, pp. 1303–1338, 2013

J. Rankin, J. J. Walker, R. Windle, S. L. Lightman and J. R. Terry, *Characterizing dynamic interactions between ultradian glucocorticoid rhythmicity and acute stress using the phase response curve*, PloS One, Vol. 7, No. 2, 2012

J. Rankin, M. Desroches, B. Krauskopf and M. Lowenberg, *Canard cycles in aircraft ground dynamics*, Nonlinear Dynamics, Vol. 66, No. 4, 2011

J. Rankin, M. Lowenberg, B. Krauskopf and E. Coetzee, *Nonlinear analysis of lateral loading during taxiway turns*, AIAA Journal of Guidance, Dynamics and Control, Vol. 33, No. 6, 2010

J. Rankin, M. Lowenberg, B. Krauskopf and E. Coetzee, *Operational parameter study of aircraft ground dynamics*, ASME Journal of Computational and Nonlinear Dynamics, Vol. 5, No. 2, 2010

J. Rankin, E. Coetzee, B. Krauskopf and M. Lowenberg, *Bifurcation and stability analysis of aircraft turning on the ground*, AIAA Journal of Guidance, Dynamics and Control, Vol. 32, No. 2, 2009

PEER REVIEWED
PROCEEDINGS

H. M. Osinga and J. Rankin *Two-parameter locus of boundary crisis: mind the gaps!* Proceedings of The 8th AIMS international conference, 2011

INVITED
PRESENTATIONS

Differential effects of attention and stimulus manipulations in auditory bistability, Talk in workshop Metastable Dynamics of Neural Ensembles Underlying Cognition at Organization for Computational Neuroscience Annual Meeting, Prague, Czech Republic   23 July 2015

Localised states in a neural field model of the primary visual cortex, Applied Non-linear Mathematics Seminar, University of Bristol, UK 19 June 2015

Differential effects of attention and input strength in auditory bistability, Seminar at Laboratoire des Systèmes Perceptifs École Normale Supérieure, Paris, France
5 June 2015

Cortical model for auditory streaming with periodic inputs, Math Biology Seminar, Department of Mathematical Sciences, New Jersey Institute of Technology, Newark, USA 28 October 2014

Bistable auditory perception: neural competition with periodic input, Talk in mini-symposium Dynamics of Multistable Perception and Decision Making at SIAM Conference on the Life Sciences, Charlotte, USA 6 August 2014

The common mechanisms driving perceptual competition, Math Biology Seminar, School of Mathematics, University of Minnesota, USA 8 April 2014

Persistent localised states in neural fields, Seminar at Centre for Systems, Dynamics and Control, University of Exeter, UK 29 October 2012

Persistent localised states in a model of working memory, Talk in mini-symposium Localised Multi-Dimensional States at Dynamics Days, Gothenburg, Sweden
7 September 2012

Neural fields models of motion perception, Seminar in Computational Neuroscience Group, Universitat Pompeu Fabra, Barcelona, Spain 23 July 2012

Dynamics of motion integration for a multistable input, Talk at GDR-Vision Annual Meeting, Institut de Neurosciences de la Timone, Marseille, France
2 December 2011

Bifurcation analysis of a neural fields model of motion perception, Seminar at Center for Neural Science, New York University, USA 19 May 2011

Multistability and bifurcations in a model of motion perception, Poster at workshop New Developments in Dynamical Systems Arising from the Biosciences, Mathematical Biosciences Institute, Columbus, USA 24 March 2011

Phase resetting in a model of a neuroendocrine system with delays, Seminar at Neu-roMathComp, Inria Sophia-Antipolis, France 21 May 2010

Nonlinear analysis of lateral loading during ground manoeuvres, Talk at 2nd Airbus International PhD Day, Bristol, UK
Awarded prize for Second Best Presentation 22 October 2009

Operational parameter study of aircraft ground dynamics, Paper presented and talk in mini-symposium Computational Methods for Nonlinear Dynamics Analysis at ASME IDETC 2009, San Diego, USA 1 September 2009

Lateral load of landing gears during stable turns, Talk in mini-symposium Nonlinear Dynamics in Engineering Applications at SIAM Conference on Applications Dynamical Systems, Snowbird, Salt Lake City, USA 18 May 2009

Nonlinear dynamics of aircraft ground handling, Paper presented and talk in mini-symposium Dynamical Systems Methods in Aerospace Engineering at European Consortium for Mathematics in Industry 2008, University College London, UK
30 June 2008

CONTRIBUTED
TALKS AND
POSTERS

Localised states in a neural field model of the primary visual cortex (talk) and *Auditory bistable perception in a neural competition model with periodic inputs* (poster) at Dynamics Days, University of Exeter, UK   7 September 2015

Differential effects of attention and input strength in auditory bistability, Talk at 1st International Conference on Mathematical Neuroscience, Juan-les-Pins, France   8 June 2015

Differential effects of attention and stimulus strength for the auditory streaming paradigm, Talk at ARO Midwinter Meeting, Baltimore USA   24 February 2015

Stimulus strength and volitional control in bistable perception, Poster at OCNS Annual Meeting Québec City Conference Center, Québec City, Canada   28 July 2014

Effects of stimulus strength and volitional control on dominance durations in bistable perception, Poster at Nonlinear Dynamics and Stochastic Methods: from Neuroscience to other Biological Applications, Pittsburgh, USA   11 March 2014

Motion direction integration following the onset of multistable stimuli: stability properties explain dynamic shifts in the dominant perceived direction, Talk at European Conference on Visual Perception, Alghero, Italy   3 September 2012

Perceptual transition dynamics of a multi-stable visual motion stimulus, Poster at Visual Sciences Society Annual Meeting, Naples, USA   13 May 2012

Switching behaviour in motion perception, Talk at Progress in Neural Field Theory, Centre for Integrative Neuroscience and Neurodynamics, University of Reading, UK   20 April 2012

Illusory persistent states in a model of visual motion perception, Talk at SIAM Conference on Applications of Dynamical Systems, Salt Lake City, USA   23 May 2011

Multistability and bifurcations in a model of motion perception, Poster at Mathematical Neuroscience Workshop, International Centre for Mathematical Sciences, Edinburgh, UK   12 April 2011

Canard cycles of an aircraft turning on the ground, Talk at 16th US National Congress of Theoretical and Applied Mechanics, Penn State University, Pennsylvania, USA   1 July 2010

Nonlinear analysis of lateral loading during ground manoeuvres, Paper presented and talk at AIAA Modelling and Simulation Technologies, Chicago, USA   12 August 2009

Nonlinear modelling and analysis of aircraft ground dynamics, Paper presented and poster at MATHMOD 2009, Vienna University of Technology, Vienna, Austria
Awarded prize for Second Best Academic Poster   12 February 2009

Nonlinear ground dynamics of aircraft: bifurcation analysis of turning solutions, Paper presented at AIAA Modelling and Simulation Technologies, Honolulu, USA   19 August 2008

Bifurcation and stability analysis of aircraft turning, Poster presented at European Consortium for Mathematics in Industry 2008, University College London, UK
Awarded prize for Best Student Poster   30 June 2008

Nonlinear ground handling of aircraft, Talk at British Applied Mathematics Colloquium, University of Manchester, UK   10 April 2008

MINI-SYMPOSIUM
ORGANISATION
Perceptual and Cognitive Dynamics, Mini-symposium co-organised with John Rinzel at Society for Mathematical Biology Annual Meeting, Nottingham, UK
                                                    to take place: 11 July 2016

Cortical spatiotemporal patterns: modelling and applications, Mini-symposium co-organised with Gregory Faye at SIAM conference on Applications of Dynamical Systems, Salt Lake City, USA   23 May 2013

Nonlinear dynamics in engineering, Mini-symposium co-organised with Dave Barton at SIAM meeting on Emerging Topics in Dynamical Systems and Partial Differential Equations, Barcelona, Spain   3 June 2010
- Talk given: *Slow-fast dynamics of an aircraft turning on the ground*

INDUSTRIAL
EXPERIENCE
Airbus in the UK, Airbus Filton Site

Landing Gear Group

- Introduction to working in the aerospace industry
- Built relationships to facilitate collaboration throughout the PhD project
                                                October 2006–December 2006

Future Projects Group

- Demonstrated the effectiveness of new methods developed during the PhD through their application to current design challenges
- Gained experience in presenting academic research to an industrial audience
- Disseminated findings to several groups working in collaboration through oral presentations and a written report
                                                    January 2009–March 2009

TRAINING AND
PROFESSIONAL
DEVELOPMENT
New York University

- *Science Writing for the General Public*
  Taught by Prof. Virginia Hughes   weekly Mar–April 2015

- *Negotiation Workshop*
  Given by Prof. Eric Max   17 July 2014

Centre International de Rencontres Mathèmatiques (CIRM), Marseille,

- *Dynamical systems in the presence of symmetry in the biological context*
  Course given by Pascal Chossat   14–18 November, 2011

- *Neural field modelling*
  Course given by Steve Coombes   2–4 November, 2011

Instituto Universitario de Investigación de Matemáticas, Universidad de Sevilla,

- *Advanced school on mathematical modelling*   22-26 June, 2009

TEACHING
EXPERIENCE
New York University

Teaching assistant for Perceptual Dynamics course in Center for Neural Science

- Gave two hour guest lecture: *Models for streaming, bistability and perceptual alternations* (included introduction to phase-plane analysis)

<div align="right">**March 2015–present**</div>

Co-supervision, mentoring and training for undergrad student project: *Effects of deviant and distractor tone during auditory build-up*

- Three month summer placement funded by Dean's Undergraduate Research Award
- Work will be presented at the Association for Research in Otolaryngology Annual Midwinter Meeting 2016

<div align="right">**March 2015–present**</div>

Inria Sophia-Antipolis, NeuroMathComp

Contribution to supervision of PhD student Kartheek Medathati: *Neural fields modelling of motion perception*

<div align="right">**2013–present**</div>

University of Bristol, Department of Engineering Mathematics

Taught tutorials, example classes and computer labs:
- Engineering Mathematics tutorials
- Mathematics with Maple (computer labs)
- Data analysis with Matlab (computer labs)
- Mathematical and Data Modelling (computer labs)

<div align="right">**January 2007–December 2009**</div>

Supervised student group project on mathematical modelling: *Ground Vehicle Dynamics*

<div align="right">**September 2009–December 2009**</div>

Co-supervised an ERASMUS student's Aeronautical Engineering final-year project: *Nonlinear ground dynamics of aircraft: bifurcation and stability analyis*

<div align="right">**January 2008–July 2008**</div>

Co-supervised Aeronatuical Engineering final-year project: *Bifurcation and stability analysis of aircraft ground manoeuvres*

<div align="right">**October 2007–March 2008**</div>

LANGUAGES AND COMPUTER SKILLS

English:	Native
French:	Fluent
Spanish:	Working knowledge
Welsh:	Working knowledge
Programming languages:	C/C++, Fortran
Scientific software:	Matlab (incl. PsychToolBox), Maple
Numerical continuation packages:	AUTO07p, Trilinos, Matcont

PERSONAL INFORMATION

Full name:	Andrew James Rankin
Date of birth:	5th June 1984
Nationality:	British