

## CURRICULUM VITAE

**FULL NAME** John Macleod BALL.

**DATE AND PLACE OF BIRTH** 19 May 1948; Farnham, Surrey, U.K.

**FAMILY SITUATION** Married with 3 children.

### EDUCATION AND POSITIONS HELD

1961-65 Mill Hill School, London NW7.

1966-69 St John's College, Cambridge.

1969-72 School of Applied Sciences, University of Sussex.

1972-74 Department of Mathematics, Heriot-Watt University and Lefschetz Center for Dynamical Systems, Brown University, Providence, R.I., USA (Science Research Council postdoctoral research fellowship).

1974-78 Heriot-Watt University, Lecturer in Mathematics.

1978-82 Heriot-Watt University, Reader in Mathematics.

1980-85 Science and Engineering Research Council Senior Fellow.

1982-96 Heriot-Watt University, Professor of Applied Analysis.

1996- Sedleian Professor of Natural Philosophy, University of Oxford, and Fellow of The Queen's College.

1998 - Honorary Professor, Heriot-Watt University

### VISITING POSITIONS

1979-80 Visiting Professor, Department of Mathematics, University of California, Berkeley.

1987-88 Visiting Professor, Laboratoire d'Analyse Numérique, Université Pierre et Marie Curie, Paris.

1990 Ordway Visiting Professor, University of Minnesota.

1992 Visiting Professor, Université Paris Dauphine.

1993-94 Visiting Professor, Institute for Advanced Study, Princeton (organizer of year on Mathematics in Materials Science).

1994 Visiting Professor, Laboratoire d'Analyse Numérique, Université Pierre et Marie Curie, Paris.

1996 Ordway Visiting Professor, University of Minnesota.

2000 Visiting Professor, University of Crete.

2001 Visiting Professor, Tata Institute for Fundamental Research Bangalore.

2002-03 Member, Institute for Advanced Study, Princeton.

2003 Visiting Professor, Université Montpellier II.

2004 Visiting Professor, University of Chile, Santiago.

2009 Visiting Professor, Laboratoire Jacques-Louis Lions, Université Pierre et Marie Curie, Paris.

2009 Visiting Fellow, American University, Beirut.

### ACADEMIC QUALIFICATIONS

Open Exhibition in Mathematics to St John's College, Cambridge.

Honours Degree in Mathematics, Cambridge University.

D.Phil. in Mechanical Engineering (supervised by Professor D E Edmunds, Mathematics Division), University of Sussex.

### OTHER EMPLOYMENT

A total of 1 year's experience (during 1965-67) systems analysis in the Mathematical Services Department, British Aircraft Corporation, Weybridge, Surrey.

## **AWARDS, FELLOWSHIPS**

Fellow of Royal Society of Edinburgh (elected 1980).  
Whittaker Prize of Edinburgh Mathematical Society 1981.  
Junior Whitehead Prize of London Mathematical Society 1982.  
Fellow of Royal Society of London (elected 1989).  
Keith Prize, Royal Society of Edinburgh, 1990.  
Honorary Degree, Ecole Polytechnique Fédérale de Lausanne, 1992.  
Naylor Prize of London Mathematical Society, 1995.  
Honorary D.Sc., Heriot-Watt University, 1998.  
Theodore von Karman Prize of the Society for Industrial and Applied Mathematics, 1999.  
Associé Etranger, Académie des Sciences, Paris, (elected 2000).  
Honorary D.Sc. University of Sussex, 2000.  
David Crighton Medal, jointly awarded by the Institute of Mathematics and its Applications and the London Mathematical Society, 2003.  
Honorary D.Sc. Université Montpellier II, 2003.  
Fellow, Institute of Mathematics and its Applications, 2003.  
Honorary D.Sc. University of Edinburgh, 2005.  
Foreign Member, Istituto Lombardo, 2005.  
Honorary Fellow, St John's College, Cambridge, 2005.  
Knighthood, 2006.  
Royal Medal, Royal Society of Edinburgh, 2006.  
Foreign Member, Norwegian Academy of Science and Letters, 2007.  
Honorary Member, Edinburgh Mathematical Society, 2008.  
Member. Academia Europaea, 2008.  
Sylvester Medal, Royal Society, 2009.  
Honorary Degree, Université Pierre et Maris Curie, Paris, 2010.  
John von Neumann Lecture and Prize, SIAM, 2012

## **CURRENT EDITORIAL POSITIONS**

Chief Editor (with R.D. James), Archive for Rational Mechanics and Analysis

Member of Editorial Boards of: *Annali di Matematica Pura ed Applicata*; *Applicable Analysis*; *Calculus of Variations and Partial Differential Equations*; *Journal de l'École Polytechnique*; *Dynamics and Differential Equations*; *Indian Journal of Pure and Applied Mathematics*; *Mathematics in Action*; *Mathematical Methods and Models in Applied Science*; *Tbilisi Mathematical Journal*.

Editor, *Oxford Mathematical Monographs*, *Oxford Lecture Series in Mathematics and its Applications* (Oxford University Press).

Editorial Board, *Unione Matematica Italiana Lecture Notes Series*.

## **PAST EDITORIAL POSITIONS**

Executive editor, *Proceedings A*, Royal Society of Edinburgh, 1987-92.

Member of Editorial Boards: *Analyse Nonlinéaire* (Institut Henri Poincaré), *Archive for Rational Mechanics and Analysis*, *Interfaces and Free Boundary Problems*, *Control, Optimization and Calculus of Variations*, *Journal de Mathématiques Pures et Appliquées*, *Journal of Differential Equations*, *Journal of Elasticity*, *Mathematical Modelling and Numerical Analysis*, *Differential Equations and Applications*, *Physica D*, *Proceedings Royal Society of London*.

Consulting Editor, Birkhauser series on *Progress in Nonlinear Differential Equations and their Applications*, 1989-94.

## **CURRENT PROFESSIONAL ACTIVITIES**

### *National and International*

Member Executive Board, International Council for Science, 2011-2014.  
Member, Conseil Scientifique, CNRS, 2010-.  
Member, Conseil Scientifique, Electricité de France, 2010-.  
Member, Scientific Advisory Board, Heilbronn Institute, 2010-.  
Member, Mathematics Subgroup to the GCHQ Science Advisory Committee, 2013-.  
Member, EPSRC Mathematical Sciences Strategic Advisory Team, 2012-.  
Board Member of MARM (Mentoring African Research in Mathematics project of IMU, LMS, AMMSI).  
Programme Committee, International Centre for Mathematical Sciences, Edinburgh, 1991-.  
Member, Board of Governors and Scientific and Academic Advisory Committee, Weizmann Institute, Rehovot, Israel, 1998-.  
Council, Weizmann Institute Foundation, 2000-.  
Member, Scientific Steering Committee, Basque Centre for Applied Mathematics, 2009 -.  
Member, Strategic Committee, Sorbonne Universities, 2012 -.  
Member, EPSRC College.

### *Oxford*

Director, Oxford Centre for Nonlinear PDE.  
Mathematical Institute REF Committee

## **PAST PROFESSIONAL ACTIVITIES**

### *National and International*

U.K. Delegation to General Assembly of International Mathematical Union, 1986, 1994, Chief Delegate 1998.  
President, Edinburgh Mathematical Society, 1989-90 and 2009.  
Sectional Committee 1, Royal Society, 1990-93.  
Steering Committee, International Centre for Mathematical Sciences, Edinburgh, 1991-96.  
Scientific Advisory Board, Isaac Newton Institute, Cambridge, 1991-95.  
Council of London Mathematical Society, 1992-93, 1995-96.  
Partial Differential Equations Sectional Panel for International Congress of Mathematicians, 1994.  
Council, Engineering and Physical Sciences Research Council, 1994-99.  
Scientific Board, Basic Research Institute in the Mathematical Sciences (Hewlett-Packard), 1994-2001.  
Jury Senior de l'Institut Universitaire de France, 1996.  
Applied Nonlinear Systems Panel, EPSRC, 1996-97.  
President of London Mathematical Society, 1996-98.  
Conseil Scientifique, l'Institut Henri Poincaré, 1996-2000.  
Scientific Committee, CNRS UMR, Lyon, 1997.  
Member, 1998 Fields Medal Committee of the International Mathematical Union.  
President 1998-99, Mathematics Section, British Association for the Advancement of Science.  
Chair of Nominating Committee, London Mathematical Society, 1999.  
Evaluation Panel for Department of Mathematics, Ecole Polytechnique Fédérale de Lausanne, 1999.  
Nominating Committee of London Mathematical Society, 1999-2001.  
Chair of Review Panel, Isaac Newton Institute, 1999.  
Chair, Mathematics Advanced Fellowships Panel of EPSRC, 2000-01.  
Science Steering Committee, National Institute for Environmental eScience, Cambridge, 2001-2.  
Conseil de Recherche et de l'Enseignement, École Polytechnique, Palaiseau, 2001-08.  
Member, CNRS Review Panel, Mathematical Institute of Toulouse, 2002.  
Program Committee, International Congress of Mathematicians, Beijing, 2002.  
Member, Peter Gruber Foundation Cosmology Prize Committee (IMU representative), 2002-04.  
Member of first Abel Prize Committee, 2002-03.  
Member, Selection Committee for position at ICTP, Trieste, 2004.

President, CNRS Evaluation Committee, Centre de Mathématiques Appliquées, Ecole Polytechnique, 2004.  
 International Council for Science, 2003-06  
 President, International Mathematical Union 2003-06.  
 Chair, Fields Medal Committee, 2006.  
 Member of Executive Committee of International Mathematical Union (IMU), 2007-10.  
 Chair, IMU Committee on Electronic Information and Communication (CEIC), 2008-10.  
 Chair, Review Committee, Department of Mathematics, Politecnico di Milano, December 2007  
 Programme Committee, 2008 European Congress of Mathematics.  
 Chair, AERES Evaluation Committee, for the mathematics laboratories of the Universities Paris 6 and 7, at Chevaleret, 2008.  
 Member, Evaluation Committee for School of Mathematics, Institute for Advanced Study, Princeton, 2008.  
 President, Selection Committee for Director of CNRS INSMI, April 2009  
 President of London Mathematical Society, July-November 2009.  
 Member, Review Committee of the School of Mathematics and Statistics, University of Sheffield, November 2009.  
 Member, Review Committee, Mathematics Department, Weizmann Institute, 1-4 November 2010.  
 Member, International Strategic Orientation Committee (COSI), École Normale Supérieure, Paris, 2010 - 2012.  
 Member, Fermat Prize Committee, 2011.  
 Chair, Scientific Steering Committee (and Member of Management Committee), Isaac Newton Institute, 2006 - 2013  
 Member of various Chair Selection Committees, e.g. at Cambridge, Edinburgh, Loughborough, St Andrews, Dundee, Kent, Sussex, Warwick, ETH Zurich.

#### *Oxford*

Committee of Management, Glasstone Benefaction 1997-2001.  
 Delegate, Oxford University Press 1998-2008.  
 Chair, Research Committee of Mathematical Institute 2000-2008.  
 Mathematical Institute Executive Committee, 2000-2009.  
 Vice-Chairman, Mathematical Institute, 2000-2009.  
 Mathematical Institute Development Committee  
 Mathematical Institute Building Committee

#### **MAJOR/RECENT CONFERENCE ORGANIZATION**

Systems of Nonlinear Partial Differential Equations, NATO ASI, Oxford, 1982.  
 The Mathematics of Nonlinear Systems (co-organiser J.F. Toland), Bath, 1991.  
 Mathematical Problems in Materials Science, International Centre for Mathematical Sciences special year, 1991-92.  
 Mathematical Continuum Mechanics (co-organisers R.D. James, A. Mielke), Oberwolfach 1997.  
 Euroconference, New Mathematical Methods in Continuum Mechanics (co-organiser S. Müller), Anogia, Crete, 2000.  
 Mathematical Continuum Mechanics (co-organisers R.D. James, S. Müller), Oberwolfach 2000.  
 Instructional Conference on Nonlinear Partial Differential Equations, ICMS 2001 (co-organisers M.J. Esteban, J.F. Toland)  
 Progress in Partial Differential Equations, ICMS 2001, (co-organisers A. Grigoryan, S. Kuksin)  
 Conference on Nonlinear Partial Differential Equations in Continuum Physics (in honour of 60th birthday of C.M. Dafermos), Heidelberg, 3-6 December 2001.  
 Quasiconvexity and its applications, Princeton, 14-16 November 2002 (co-organisers Weinan E., R.V. Kohn, S. Müller).  
 PDE and Materials, Oberwolfach, 7-13 September 2003 (co-organisers: R.D. James, S. Müller).  
 PDE and Materials, Oberwolfach, 24-30 September 2006 (co-organisers: R.D. James, S. Müller).

Workshop on Elastic Stability, Mathematical Institute, University of Oxford, 3 October 2008.

Workshop on the Mathematics of Weather and Climate Prediction Office, Exeter, 30 March - 2 April 2009 (co-organisers M.J.P. Cullen, S.B. Kuksin)

Nonlinear PDE and Free Boundary Problems, University of Warwick, 15-19 June 2009 (co-organisers: J. Rodrigo, P. Topping).

Mathematics of Materials Science, LMSEPSRC Short Course, University of Oxford, 28 June-3 July 2009.

PDE and Materials, Oberwolfach, 13-19 September 2009 (co-organisers: R.D. James, S. Müller).

Workshop on Atomistic Models of Solids, University of Oxford, 7-8 December 2009 (co-organisers: J. Chapman, Weinan E, G. Friesecke, E. Süli, J. Zimmer).

New Developments in Elasticity: The Legacy of Robert Hooke, University of Oxford, 6-8 January 2010 (co-organizers: R.V. Kohn, J.R. Ockendon, J.M. Rice).

Entropy and Convexity for Nonlinear Partial Differential Equations, Royal Society International Scientific Seminar, Kavli Royal Society International Centre, 16-17 June 2011 (co-organiser G-Q. Chen).

Pattern Formation and Multiscale Phenomena in Materials, OxMOS/PIRE workshop, Oxford, 26-28 September 2011, (co-organizers R.V. Kohn, B. Niethammer, F. Otto).

Mathematics of Liquid Crystals, Isaac Newton Institute, Cambridge, 6 month research programme January-July 2013 (co-organisers D. Chillingworth, M. Osipov, P. Palffy-Muhoray, M. Warner).

Vector-valued Partial Differential Equations and Applications, CIME-EMS Summer School in Applied Mathematics, Cetraro, 8-12 July 2013 (co-organizer P. Marcellini).

Mathematics and Mechanics in the Search for New Materials, BIRS, Banff, Canada, 14-18 July 2013 (co-organizers K. Bhattacharya, A. De Simone).

## CURRENT MAJOR RESEARCH GRANTS

Principal Investigator, Analysis of Nonlinear Partial Differential Equations, EPSRC Science and Innovation Grant, £2.78 million, 2007-13.

European Research Council Advanced Investigator grant, Mathematics of Solid and Liquid Crystals, 2012-17, €2 million.

## Ph.D STUDENTS

G. Andrews 1979, B. Dacorogna 1980, M.C. Calderer 1981, J.C. Currie 1983, J. Sivaloganathan 1984, N.C. Owen 1986, P.J. Davies 1987, S. Müller 1989, P. Lin 1990, G. Friesecke 1993, G.J. Ruddock 1994, A. Taheri 1998, Z. Iqbal 1999, A. Forclaz 2002, J.J. Bevan 2003, M. Jungen 2005, D. Henao 2009, B. Muite 2009, Y. Sengul 2010, B. Tsering Xiao 2011, K. Koumatos, 2012, M. Wilkinson 2013.

*Current Ph.D. students:* S. Bedford, L. Liu, M. Nieuwenhuis, A. Mühlemann, J. Taylor

## SELECTED INVITED LECTURES IN LAST 5 YEARS

*The Q-tensor theory of liquid crystals*, Annual meeting of Chinese Mathematical Society, Xiamen, 22 April 2009.

*The Q-tensor theory of liquid crystals*, 1st British-Nordic Congress of Mathematicians, Oslo, 10 June 2009.

*Mathematics in the public eye: the story of Perelman and the Poincaré conjecture*, Public lecture, Zientzia Foroa, Bilbao, 18 June 2009.

*Q-tensor theory of liquid crystals*, 7th ISAAC Congress, Imperial College, 13 July 2009.

*Mathematics in the public eye: the story of Perelman and the Poincaré conjecture*, Public lecture, National University of Singapore, 22 July 2009.

*Support for Mathematics in Developing Countries*, Conference on Regional and Interregional Cooperation to Strengthen Basic Sciences in Developing Countries, Addis Ababa, 1 September 2009.

*Interfaces, surface energy and solid phase transformations*, Paris-London Analysis Seminar, London, 2 October 2009.

*Mathematics in the public eye: the story of Perelman and the Poincaré conjecture*, Public lecture, American University, Beirut, 28 October 2009.

Member of Round Table *Les mathématiques, une ressource stratégique pour l'avenir* at Maths à venir, Paris, 2 December 2009.

*Mathematics in the Public Eye: the story of Perelman and the Poincaré conjecture*, Collingwood Lecture, University of Durham, 6 May 2010.

*Good boundary directions and topologically-equivalent smooth approximations of rough domains*, Meeting in honour of 60<sup>th</sup> birthday of Jeff Webb, Glasgow, 4 June 2010.

*The Q-tensor theory of liquid crystals*, Lecture Course, Summer School, Cotonou, Bénin, 28 June - 2 July 2010.

Chair, *Round Table on The Use of Metrics in Evaluating Research*, International Congress of Mathematicians, Hyderabad, 26 August 2010.

*The de Gennes theory of liquid crystals*, Kepler lecture, University of Regensburg, 18 November 2010.

*Mathematical models of polymer elasticity*, From Polymer Physics to Nonlinear Elasticity workshop, Paris, 17 January 2011.

*The work of IMU and CEIC on journals and related issues*, Workshop on Mathematics Journals, MSRI, Berkeley, 14-16 February 2011.

*Variational problems for solid and liquid crystals*, Young Researchers in Mathematics, University of Warwick, 16 April 2011.

*Transformations de phases solides, interfaces, et l'énergie superficielle*, 10<sup>th</sup> Colloque National en Calcul de Structures, Giens, France, 9-13 May 2011.

Discussion leader, Gordon Research conference on Liquid Crystals, Mount Holyoke College, Massachusetts, 19-24 June, 2011.

*Variational analysis of the de Gennes theory of liquid crystals, and Quasiconvexity Conditions and the Nucleation of Austenite*, Invited minisymposium lectures, ICIAM 2011, Vancouver, 17-22 July 2011.

*Nucleation of austenite in martensite by localized heating*, International Congress on Martensitic Transformations, Osaka, Japan, 4-9 September 2011.

*What can mathematics say about liquid crystals*, Public lecture, ICMS Edinburgh, 22 September 2011.

*Mathematics of solid and liquid crystals*, lecture course, Winter School, Würzburg, 9-13 January 2012.

*Mathematics of liquid crystals*, Cambridge Centre for Analysis short course, 13-17 February 2012.

*Quasiconvexity and experiments on phase nucleation*, Richard von Mises lecture, Humboldt University, Berlin, 22 June 2012.

*Partial regularity and smooth topology-preserving approximations of rough domains*, Elmer Rees 60th birthday meeting, Bristol, 20 April 2012.

*Quasiconvexity, stability and nucleation*, Peter Olver 60th birthday meeting, Minneapolis, 17 May 2012.

*The mathematics of liquid crystals*, Brussels Spring School, 31 May-1 June 2012.

*Liquid crystals for mathematicians*, the John von Neumann lecture, SIAM Annual Meeting, Minneapolis, 10 July 2012.

*Quasistatic nonlinear viscoelasticity and gradient flows*, SIAM Annual Meeting, Minneapolis, 11 July 2012.

*What can mathematics say about liquid crystals*, Public lecture, Shanghai Jiao Tong University, 29 October 2012.

*Partial regularity and smooth topology-preserving approximations of rough domains*, Robin Knops 80th birthday meeting, Bristol, 10 December 2012.

*Mathematical issues relating to the Landau - de Gennes theory of liquid crystals*, Liquid crystals and related topics workshop, NIMS, S. Korea, 20-22 December 2012.

*Function spaces and liquid crystals*, Isaac Newton Institute Mathematics of Liquid Crystals Workshop 1, 7-11 January 2013.

*Satisfaction of the eigenvalue constraints on the  $Q$ -tensor*, Isaac Newton Institute Mathematics of Liquid Crystals Workshop 3, 18-22 March 2013.

*Microstructure genesis and morphology*, invited lecture course, Carnegie Mellon University Summer School, 5-7 June 2013.

*Quasistatic nonlinear viscoelasticity and gradient flows*, SIAM conference on Mathematical Aspects of Materials Science, Philadelphia, 12 June 2013.

*Quasistatic nonlinear viscoelasticity and gradient flows*, Workshop on recent trends in classical and complex fluids, University of Sussex, 5 September 2013.

*Some mathematical questions related to the modelling of liquid crystals*, ESF workshop on Defect Assembled Soft Matter for Nanoscience and Biotechnology, University of Maribor, Slovenia, 15 September 2013.

## SEMINARS

At the following universities:

Aberdeen, Academia Sinica (Taipei), Amsterdam, Antwerp, Australian National University, Bangalore, Bangor, Bath, Beijing (Peking, Tsing Hua, Academia Sinica), Berlin, Berkeley, Bonn, Bristol, Brown, Cambridge, Carnegie-Mellon, Chicago, Santiago (Centre for Mathematical Modelling, Catholic University), Columbia, Courant Institute, Cyprus, Delft, Delhi, Duke, Dundee, Edinburgh, Essex, Florence, Fudan, Fuzhou, Glasgow, Grenoble, Guwahati, Heidelberg, Hong Kong (City University), Houston, IMPA (Rio de Janeiro), Imperial College, Kent State, Kentucky, Kyoto, EPFL Lausanne, Leiden, Leipzig, Leningrad, Liverpool, Lyngby, Macquarie, Maryland, Minnesota, Modena, Monash, Moscow, Mumbai, Nancy, Naples, Newcastle, New Jersey Institute of Technology, New South Wales, Nottingham, Nottingham Trent, North Carolina State, Oregon State, Oxford, Paris (Collège de France, Dauphine, Paris 6, ONERA, Orsay), Pavia, Pennsylvania, Penn State, Pisa, Princeton, Rome, Rutgers, St. Andrews, Santa Barbara, Shanghai Jiaotong, Shillong, Stanford, Strathclyde, Stuttgart, Sussex, Swansea, Syracuse, Taiwan National University, Temple, Toronto, Toulouse, University College, Warsaw, Warwick, Wisconsin, Yerevan, York, Xian (Jiaotong), ETH Zurich.