

CURRICULUM VITAE

Personal Information

Name **A.J. (Arjan) van der Schaft**

Date and place of birth 1955, Vlaardingen, The Netherlands

Work address Johann Bernoulli Institute for Mathematics and Computer Science
University of Groningen
Nijenborgh 9, 9747AG, Groningen

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Doctorate (mathematics)

Date 3 June 1983
University University of Groningen
Supervisor Prof. Jan C. Willems
Thesis title *System theoretic descriptions of physical systems*

Past positions

2005–present **Full Professor**, "Systems, Control and Applied Analysis", Johann Bernoulli
Institute for Mathematics and Computer Science, University of Groningen.
2000–2005 **Full Professor**, "Mathematical Systems and Control Theory", Department of
Applied Mathematics, University of Twente.
1992–1999 **Visiting Researcher**, 0.1fte appointment at the Centre for Mathematics and
Computer Science (CWI), Amsterdam.
1987–2000 **Associate Professor** (UHD), Department of Applied Mathematics, University of
Twente.
1982–1987 **Assistant Professor** (UHD), Department of Applied Mathematics, University of
Twente.
1979–1982 **Temporary staff member**, Department of Mathematics, University of Groningen.
1979–1979 **Temporary staff member**, Department of Mathematics, University of Utrecht.
1976–1979 **Teaching assistant**, Department of Mathematics, University of Groningen.

Long-term working visits

2015 **Long-term Visitor** at the institute of Mathematics and its Applications (IMA),
Minneapolis, MI, USA (August–October).
1998 **Research sabbatical** at the Conservatoire National des Arts et Métiers, Paris,
France (September–December).
1991 **Visiting Professor** Arizona State University, Tempe, AZ, USA (February–May).

Publications:

Journal publications:	125
Reviewed chapters in books:	55
Reviewed conference proceedings:	217

Books:

A.J. van der Schaft, D. Jeltsema, *Port-Hamiltonian Systems Theory: An Introductory Overview*, NOW Publishers, Boston-Delft, 2014, originally published as Foundations and Trends in Systems and Control, Vol. 1, No. 2-3 (2014), pp. 173-378, 2014.

A.J. van der Schaft, J.M. Schumacher, *An Introduction to Hybrid Dynamical Systems*, Lect. Notes in Control and Inf. Sciences, Vol. 251, Springer-Verlag, London, 2000, p. xiv+174.

A.J. van der Schaft, *L₂-Gain and Passivity Techniques in Nonlinear Control*, Lect. Notes in Control and Information Sciences, Vol. 218, Springer-Verlag, Berlin, 1996, 2nd edition (Springer Communications and Control Engineering series), 2000, 3rd revised and enlarged edition, Springer-International, 2017, p. xviii+321.

H. Nijmeijer, A.J. van der Schaft, *Nonlinear Dynamical Control Systems*, Springer-Verlag, New York, 1990, p. xiii+467. Corrected printing 2016, p. .

P.E. Crouch, A.J. van der Schaft, *Variational and Hamiltonian control systems*, Lect. Notes in Control and Information Sciences, Vol. 101, Springer-Verlag, Berlin, 1987, p. 121.

A.J. van der Schaft, *System theoretic descriptions of physical systems*, CWI Tract No. 3, CWI, Amsterdam, 1984, p. 256.

Edited conference proceedings:

Proceedings of the 21st International Symposium on Mathematical Theory of Networks and Systems (MTNS 2014), Groningen, July 7--11, 2014, Editors M.K. Camlibel, J.M.A. Scherpen, H.L. Trentelman, A.J. van der Schaft. ISSN 2311-8903, ISBN 978-90-367-6321-9.

Proceedings of 4th IFAC Workshop on Lagrangian and Hamiltonian Methods for Non Linear Control (LHMNLC 2012), International Federation of Automatic Control, Bertinoro, August 29--31, 2012 Editors A. Macchelli, B. Maschke, A.J. van der Schaft.

Proceedings 2nd IFAC Workshop on Lagrangian and Hamiltonian Methods for Nonlinear Control (Seville April 2003), Editors A. Astolfi, F. Gordillo, A.J. van der Schaft, Elsevier-Pergamon, 2003.

Stability and Stabilization of Nonlinear Systems (Ghent April 1999), Editors D. Aeyels, F. Lamnabhi-Lagarrigue, A.J. van der Schaft, Lecture Notes in Control and Information Sciences 246, Springer-Verlag, London, 1999.

Proceedings 4th IFAC Nonlinear Control Systems Design Symposium 1998} (Enschede July 1998, Editors H.J.C. Huijberts, H. Nijmeijer, A.J. van der Schaft, J.M.A. Scherpen, Elsevier-Pergamon, 1998.

Awards and honors

- 2016 **Fellow of the International Federation of Automatic Control (IFAC).**
- 2013 **Recipient of the 3-yearly awarded *Certificate of Excellent Achievements*,** International Federation of Automatic Control (IFAC) Technical Committee on Nonlinear Systems.
- 2013 **Invited Plenary Lecturer,** 84th Annual Meeting of the Gesellschaft für Angewandte Mathematik und Mechanik (GAMM), Novi-Sad.
- 2008 **Co-recipient of the SICE Takeda Best Paper Prize,** for the paper: 'An approximation method for the stabilizing solution of the Hamilton-Jacobi equation for integrable systems, a Hamiltonian perturbation approach', *Transactions of the Society of Instrument and Control Engineers (SICE)*, vol. 43, pp. 572-580, 2007, by N. Sakamoto and A.J. van der Schaft.
- 2006 **Invited semi-plenary speaker** at the International Congress of Mathematicians, Madrid.
- 2002 **Fellow of the Institute of Electrical and Electronics Engineers (IEEE).**
- 2000 **Most cited Technical Sciences research paper in the period 1994-1998:** the paper " L_2 -gain analysis of nonlinear systems and nonlinear state feedback H_∞ control, *IEEE Trans. Autom. Contr. AC-37*, pp. 770-784, 1992" was the Dutch research paper in international scientific journals within the Technical Sciences that obtained the largest number of citations during the evaluation period 1994-1998. *Source:* Nederlands Observatorium voor Wetenschap en Techniek, Wetenschaps- en Technologie-indicatoren Rapport 2000, page 59, Table 3.10.

Conference organization

- 2014 **Co-organizer** and **Co-chair** of the 21st edition of the International Symposium on Mathematical Theory of Networks and Systems (MTNS), Groningen, July 7-11, 2014; 452 participants.
- 2012 **Co-organizer** and **Co-chair** of for the 4th IFAC Workshop on Lagrangian and Hamiltonian Methods for Nonlinear Control, Bertinoro, Italy, August 29-31, 2012, +/- 70 participants.
- 2004 **Co-organizer** CDC Workshop Stochastic Hybrid Systems, Paradise Island, Bahamas, December 2004.
- 2003 **Co-organizer** and **Co-chair** of the 2nd IFAC Workshop Lagrangian and Hamiltonian Methods in Nonlinear Control, Seville, April 3-5, 2003, +/- 80 participants.
- 2001 **Co-organizer** and **Co-chair** of the Summerschool Geometric Modelling and Control of Physical Systems, LAG, Grenoble, September 17-21, 2001.
- 1999 **Co-organizer** and **Co-chair** of the 1st Workshop of the EU-TMR Nonlinear Control Network, 'Stability and Stabilization of Nonlinear Systems, Ghent, March 15-16, 1999.
- 1998 **Co-organizer** and **Co-chair** IFAC Nonlinear Control Systems Design Symposium 1998, University of Twente, July 1-3, 1998, +/- 250 participants.

International conference program committee membership

- **IFAC Nonlinear Control Systems Design Symposium** (NOLCOS) '89; '92; '95; '01; '04; '07; '10; '13; '16
- **Hybrid Systems: Computation and Control** (HSCC) '00; '02; '04; '05; '07
- **Mechatronics** '02
- **European Control Conference** '95
- **Mathematical Theory of Networks and Systems** (MTNS) '87; '04; '08; '10; '12; '14; '16; '18
- **IFAC Workshop on Lagrangian and Hamiltonian Methods in Nonlinear Control** (LHMNLC) '00, '03, '06, '12, '15
- **IFAC Conference on Analysis and Design of Hybrid Systems** (ADHS) '09; '12; '15

Selected Invited Lectures at conferences and workshops (2000-onwards)

- 2016 *Towards nonlinear network synthesis*, invited talk Workshop on Mathematical Aspects of Network Synthesis, Cambridge, UK.
- 2015 *Port-Hamiltonian modeling of power networks*, Invited Plenary Talk 5th IFAC Lagrangian and Hamiltonian Methods in Nonlinear Control, Lyon, France.
- 2014 *Geometric network modeling and control of physical systems*, Nankai University, Tianjin, China.
- 2013 *Network modeling and control of multi-physics systems*, Invited Plenary Lecture at the 84th Annual Meeting of the Gesellschaft für Angewandte Mathematik und Mechanik (GAMM), Novi-Sad, Serbia.
- 2012 *Bisimulation theory for multi-modal physical systems*, Cyber-Physical Systems Workshop, London, UK.
- 2011 *On infinite-dimensional port-Hamiltonian systems*, ISEM Workshop Infinite-dimensional systems, Blaubeuren, Germany.
- 2008 *The port-Hamiltonian approach to physical systems modeling and control*, Minicourse Benelux Meeting on Systems and Control, Veldhoven, NL.
- 2007 *Beyond passivity: port-Hamiltonian systems*, Semi-plenary talk at the IFAC Nonlinear Control Systems Design Symposium (NOLCOS) '07, Pretoria, South Africa.
- 2006 *From networks models to geometry: a new view on Hamiltonian systems*, Invited Section Lecture, International Congress of Mathematicians, Madrid, 22-30 August 2006.
- 2006 Invited Lectures on *Geometric modelling and control of multi-physics systems*, IIT Bombay, India.
- 2004 *Compositional specification of stochastic hybrid systems*, Workshop Conference on Decision and Control, Paradise Island, Bahamas.
- 2004 *Compositional modeling of hybrid systems*, Invited speaker EU-HYBRIDGE summerschool Patras, Greece.
- 2004 *Bisimulation of hybrid systems*, Invited speaker at the Spring Days of the Institute for Programming Research and Algorithmics (IPA), Heeze, NL.
- 2003 *Dirac structures and Port-Hamiltonian systems*, Invited speaker Euron/Geoplex Summer School on Modelling and Control of Complex Dynamical Systems - from Ports to Robotics, Bertinoro, Italy.
- 2002 *Mathematical Theory of Network Models of Physical Systems*, Semi-Plenary Lecture, 15th Symposium on Mathematical Theory of Networks and Systems (MTNS2002) South Bend, USA.
- 2001 *Distributed-parameter port-Hamiltonian systems*. Invited lecture Summerschool on Geometric Modelling and Control of Physical Systems, Grenoble, France.
- 2001 *Geometric modeling of physical network models*, Invited plenary talk XI International Symposium on Theoretical Electrical Engineering, Linz, Austria.
- 2001 *Generalized Hamiltonian modeling of distributed parameter systems with boundary energy flow*, United Kingdom. Invited lecture, London Mathematical Society Workshop Mathematical Theory of Nonlinear Control, Bath, UK.
- 2001 *Hamiltonian modelling of interconnected and constrained physical systems*, Invited lecture at the celebration *25 Years of Nonlinear Control at the ENSMP*, École des Mines de Paris, Fontaineblau, France.
- 2000 *Hybrid Systems*, Murcia, Invited speaker EU-TMR NCN Summerschool, Spain.
- 2000 *Physical systems with variable topology*, Invited lecture European project Hybrid Control and Automotive Applications, Lund, Sweden.

Supervised PhD students

(I) Supervised PhD students (name, year of completion and university, supervisory role, nationality, thesis title, and current position)

- L.L.M. van der Wegen** (September 1990, Twente) (co-supervision), NL
Title: *Local disturbance decoupling with stability for nonlinear systems*
Current employment: Assistant Professor, School of Management and Governance, University of Twente
- H.J.C. Huijberts** (May 1991, Twente) (co-supervision), NL
Title: *Dynamic feedback in nonlinear synthesis problems*
Current employment: Reader in Control & Dynamics & Director of Taught Programmes, Queen Mary University of London
- J.M.A. Scherpen** (March 1994, Twente) (supervision), NL
Title: *Balancing for nonlinear systems*
Current employment: Professor Discrete Technology and Product Automation, Director Research Institute Industrial Engineering and Management, University of Groningen
- W.C.A. Maas** (March 1996, Twente) (supervision), NL
Title: *Nonlinear H-infinity control: the singular case*
Current employment: Researcher, KPN Research Lab
- G. Blankenstein** (November 2000, Twente) (supervision and promotor), NL
Title: *Implicit Hamiltonian systems: symmetry and interconnection*
Current employment: Lecturer, Hogeschool Rotterdam
- E. Schrijver** (April 2002, Twente) (co-supervision and co-promotor), NL
Title: *Improved robot tracking control for laser welding & Disturbance estimation and compensation*
Current employment: Manager, Youniq BV
- G. Golo** (October 2002, Twente) (co-supervision and co-promotor), Serbia
Title: *Interconnection structures in port-based modelling: tools for analysis and simulation*
Current employment: Researcher, Shell Research
- M. Cadic** (October 2003, Twente) (promotor), France
Title: *Strongly robust adaptive control: the strong robustness approach*
Current employment: Manager, Bell Helicopter, TX
- V. Talasila** (December 2004, Twente) (supervision and promotor), India
Title: *A Hamiltonian approach to discrete mechanics: issues in geometry, modelling, simulation and control*
Current employment: Associate Professor, MSR Institute of Technology (MSRIT), Bangalore, India
- A.A. Julius** (February 2005, Twente) (supervision and promotor), Indonesia
Title: *On interconnection of continuous and discrete systems: a behavioral perspective*
Current employment: Assistant Professor, Department of Electrical, Computer, and Systems Engineering, Rensselaer Polytechnic Institute, Troy, NY
- A.A. Moelja** (November 2005, Twente) (promotor), Indonesia
Title: *H2 control of systems with I/O delays*
Current employment: Researcher, Nokia Siemens Networks, Singapore
- S.N. Strubbe** (December 2005, Twente) (supervision and promotor), NL
Title: *Compositional modelling of stochastic hybrid systems*
Current employment: unknown
- R. Pasumathy** (September 2006, Twente) (supervision and promotor), India
Title: *On analysis and control of interconnected finite- and infinite-dimensional physical systems*
Current employment: Assistant Professor, Dept. Electrical Engineering, Indian Institute of Technology, Madras, Chennai, India
- J.A. Villegas** (May 2007, Twente) (co-supervision and promotor), Colombia
Title: *A port-Hamiltonian approach to distributed parameter systems*
Current employment: Researcher, AVL Powertrain, UK
- N.E. Ligterink** (August 2007, Twente) (co-supervision and co-promotor), NL
Title: *Functional system dynamics*
Current employment: Researcher, TNO, Delft
- R. Polyuga** (April 2010, Groningen) (supervision and promotor), Ukrain
Title: *Model reduction of port-Hamiltonian systems*
Current employment: Quantitative Risk Analyst, Risk Management & Strategy ABN-AMRO

A. Venkatraman (April 2010, Groningen) (supervision and promotor), India
 Title: *Control of port-Hamiltonian systems: observer design and alternate passive input-output pairs*
 Current employment: Quantitative Analyst, Royal Bank of Scotland Group

F. Kerber (March 2011, Groningen) (supervision and promotor), Germany
 Title: *Compositional analysis and control of dynamical systems*
 Current employment: Hochschule, Augsburg

H. Vinjamoor (July 2011, Groningen) (supervision and promotor), India
 Title: *Achievability of linear systems up to bisimulation*
 Current employment: Researcher, EATON, Pune, India

M. Seslija (March 2013, Groningen) (co-supervision and co-promotor), Bosnia
 Title: *Discrete geometry approach to structure-preserving discretisation of port-Hamiltonian systems*
 Current employment: post-doc Electrical Engineering, University of Cambridge, UK

E. Vos (January 2015, Groningen) (co-supervision and co-promotor), NL
 Title: *Port-Hamiltonian approach to formation and control*
 Current employment: DNV-GL, Groningen, NL.

J. Wei (February 2016) (supervision and promotor), China
 Topic: *Consensus dynamics in distribution networks and nonlinear multi-agent systems*
 Current employment: post-doc, Electrical Engineering, KTH Stockholm

(II) Current PhD students (name, years of study, supervisory role, nationality, thesis topic)

A. Ivanov (2011-) (co-supervision and co-promotor), Ukraine
 Topic: *Network design and the response of a system to stress and deterioration*

G. Folkertsma (2012-, U Twente) (co-supervision and co-promotor), NL
 Topic: *Fast-running energy-efficient quadruped*

N. Yulia Megawati (2013-2017) (supervision and promotor), Indonesia
 Topic: *Bisimulation and verification for dynamical systems with uncertainty*

P. Monshizadeh (2014-2018) (supervision and promotor), Iran
 Topic: *Energy autonomous smart micro grids*

F. Koerts (2014-2018) (co-supervision and co-promotor), NL
 Topic: *Energy management strategies for interconnected smart microgrids*

T. Stegink (2014-2018) (co-supervision and co-promotor), NL
 Topic: *Energy-based analysis and control of the grid: dealing with uncertainty and markets*

R. Reyes-Baez (2015-2019) (supervision and promotor), Mexico
 Title: *Incremental stabilization of mechanical systems*

L. Wang (2015-2017) (co-supervision and co-promotor), China
 Title: *Thermodynamical systems*

M. Jeeninga (2016-2020) (co-supervision and co-promotor), NL
 Topic: *Energy management strategies for interconnected smart microgrids*

(III) Short-term international PhD supervision (name, year of visit, university, nationality, current position)

Within the context of, in particular, European projects Van der Schaft has supervised the following PhD. students for periods of 2-10 months:

M. Dalsmo (1996) (NTNU Trondheim), Norway,
 Current position: Industry Client Leader & Executive, IBM Chemical and Petroleum industries, Oslo

G. Escobar (1998) (Lab. Signaux et Systemes, Gif-sur-Yvette), Mexico
 Current position: Professor, Universidad de Yucatan, Merida, Mexico

H. Rodrigues (2000) (Lab. Signaux et Systemes, Gif-sur-Yvette), Mexico
 Current position: Researcher, Seccion de Mecatronica, Departamento de Ingenier'a Electrica, CINVESTAV IPN, Mexico D.F.

J. Cervera (2001) (University of Murcia), Spain
 Current position: Professor, Departamento de Informatica y Sistemas (Facultad de Informatica) de la Universidad de Murcia, Spain

L. Gentili (2002) (University of Bologna, Italy), Italy
 Current position: Assistant Professor, University of Bologna, Italy

M. Zainea (2006) (Lab. Signaux et Systemes, Rennes, France), Romania
 Current position: Senior Industrial Controls Engineer, Symbotic, US

J. Carrasco (2007) (University of Murcia), Spain
 Current position: Lecturer, School of Electrical and Electronic Engineering, The University of Manchester, UK

J. P. Fortney (2007-08) (University of Arizona, US), US
 Current position: Assistant Professor, Zayed University, Dubai

I. Sarra (2008) (Lab Signaux et Systemes, Gif-sur-Yvette, France), Greece
 Current position: post-doc Centre Automatique et Systèmes, Ecole des Mines, France

D. Zonetti (2014) (Lab. des Signaux et Systèmes, Gif-sur-Yvette, France), Italy

L. P. Borja (2016) (Lab. des Signaux et Systèmes, Gif-sur-Yvette, France), Mexico

M. Cuccuzzella (2016) (Dipartimento di Ingegneria Industriale e dell'Informazione University of Pavia, Italy), Italy

Supervised Post-doctoral Fellows

(I) Past Post-doc supervision (name, year(s), nationality, current position) Total: 12

M. Reyhanoglu (1995-96), Turkey
 Current position: Professor of Engineering Physics, Embry-Riddle Aeronautical University, Daytona Beach, FL

J.-I. Imura (1998-99), Japan
 Current position: Professor, Tokyo Institute of Technology, Japan

L. Moreau (2001), Belgium
 Current position: Project Coordinator, ArcelorMittal, Ghent, Belgium

J. Cortes (2001), Spain
 Current position: Professor, Department of Mechanical and Aerospace Engineering at the University of California, San Diego, CA

J. Clemente Gallardo (2001), Spain
 Current position: Professor, Instituto de Biocomputacion y Física de los Sistemas Complejos, Universidad de Zaragoza, Spain

A. Macchelli (2003), Italy
 Current position: Researcher, University of Bologna, Department of Electrical, Electronic and Information Engineering, Italy

F. Gomez-Estern (2003), Spain
 Current position: Director de la Escuela de Ingenieria Electromecanica, de la Universidad Loyola Andaluc'a, Sevilla/Cordoba, Spain

G. Golo (2003-04), Serbia
 Current position: Shell Research, The Hague

G. Pola (2004), Italy
 Current position: Assistant Professor, Department of Information Engineering, Computer Science and Mathematics, University of L'Aquila, Italy

D. Eberard (2005-06), France
 Current position: Maitre de Conférences, INSA, Lyon, France

S. Rao (2012-14), India
 Current position: Lecturer, University of Ghent Global Campus, Incheon, South-Korea

S. Fiaz (2013-14), India
 Current position: Eaton, Pune, India

N. Monshizadeh (2014-2016), Iran
 Current position: Post-doc, University of Cambridge, UK

international graduate courses

Recent:

- ***Hamiltonian Systems: from Modeling to Control***, Elgersburg School on Mathematical Systems Theory, Germany, 2012.
- ***Nonlinear Control and Synchronization of Large-Scale systems*** (with H. Nijmeijer), Graduate School in Systems, Optimization, Control and Networks, Louvain-la-Neuve, Belgium, 2012.
- ***Network Modeling and Control of Multi-physics Systems***, CINVESTAV, Mexico-City, Mexico, 2013
- ***Modeling and Control of Multiphysics Systems*** (with D. Jeltsema), PhD course offered by the European Embedded Control Institute, Istanbul, May 4–8, 2015.
- ***Port-Hamiltonian Systems*** (with P.C. Breedveld), Summer school, TU Berlin, April 4–6, 2016.

Forthcoming:

- ***Energy-based Modeling and Control of Physical Systems*** (with D. Jeltsema), PhD course of the European Embedded Control Institute (EECI), Feb.27-March 3, 2017

Editorial and management activities

Editorial Board Memberships

2015- present **Associate Editor** for *Annual Reviews in Control*
2009- present **Associate Editor** for *Journal of Geometric Mechanics*
2006-2009 **Associate Editor** for *ESAIM COCV*
2004, 2013 **Guest editor** of Special Issue for *European Journal of Control*
2002-2013 **Associate Editor** for *Systems & Control Letters*
2001-2014 **Editor-at-Large** for *European Journal of Control*
1999-2003 **Associate Editor** for *SIAM Journal on Control and Optimization*
1996-2006 **Member Editorial Board** *CWI Tracts*
1993-1997 **Associate Editor** for *IEEE Transactions on Automatic Control*
1991-1995 **Member Editorial Board** *J. of Nonlinear Science and Nonlinear Science Today*
1988-1993 **Associate Editor** for *Systems & Control Letters*
1991 **Guest editor** of Special Issue for *Int. Journal on Robust and Nonlinear Control*

International Committees

2006-present **Steering Committee Member**, International Symposium on Mathematical Theory of Networks and Systems (MTNs).

National Committees

2001-2015 **Member**, Executive Board of the Dutch Institute of Systems and Control (DISC)
2012-2016 **Member**, Research Committee Platform Wiskunde Nederland (PWN)
2004-2008 **Member**, NWO 'Open Competition' Evaluation Committee - Mathematics
2002-2007 **Member**, 'Overlegorgaan Onderzoekscholen Wiskunde' (OOW)

Management roles at the University of Groningen (since 2005)

2012-present **Member**, Educational Committee Mathematics and Applied Mathematics
2010-2015 **Member**, Board Johann Bernoulli Institute for Mathematics and Computer Science
2006-2009 **Deputy-Director of Education**, University of Groningen, responsible for Mathematics and Applied Mathematics
2005- present **Chairman**, Research Unit Systems, Control, and Applied Analysis