Wetenschappelijk verslag 2006 *(januari t/m december)*
NWO-cluster NDNS+

Binnengehaalde projecten

- 'Reduced Models for Multiscale Reaction-Diffusion Dynamics' *NWO-vernieuwingsimpuls Veni* (A. Zagaris, CWI)

- 'Electric fracture: growth and branching of ionized channels' *Extension STW-project* (U. Ebert, CWI)

- 'Monotonicity preservation for general multistep methods' *NWO-EW, Open Competitie* (W. Hundsdorfer, CWI)

- 'Adaptive multisymplectic box schemes for Hamiltonian wave equations' *NWO-EW, Open Competitie* (J. Frank, CWI)

- 'Formation of singularities in natural systems' *NWO-vernieuwingsimpus Vidi* (V. Rottschäfer, UL)

Cummulatief overzicht aanstellingen binnen NDNS+

RUG:
- Prof. dr. Arjan van der Schaft, HL (0,9), *1 september 2005 – 2009*
- Alef Sterk, PhD-student, *per 1 september 2006*
- Aneesh Venkatraman, PhD-student, *per 1 mei 2006*

CWI:
- Dr. Daan Crommelin, tenure track UD*, per 1 september 2006*
- Dr. Jens Rademacher, tenure track UD, *per 1 september 2006*
- Dr. Fabian Brau, postdoc, *per oktober 2005* (3 jaar)*
  Dr. Alejandro Luque, postdoc, *per augustus 2005* (2 jaar), extension met 1 jaar*
- Dr. Antonios Zagaris, postdoc, *per 1 mei 2005,* postdoc (Veni), *1 september 2006-2011 (UvA)*

- Jeroen Hazewinkel, PhD-student, *per 1 februari 2006* (mede-begeleider L. Maas, NIOZ)
- Bob Peeters, PhD-student, *per 1 oktober 2006* (hoofdbegeleider O. Bokhove, UT)
  Stationering CWI voor 50% van de werktijd

UL:
- Dr. Jacqueline Meulman, HL (0,2) Toegepaste Statistiek en Datatheorie, per 1 april 2006
- Dr. Sander Hille, UD Analyse en Dynamische Systemen, per 1 januari 2006
- Dr. Vivi Rottschäfer, UD Analyse en Dynamische Systemen (Vidi), per 1 januari 2006
- Daniel Worm, PhD-student, per 1 oktober (begeleider S. Hille)
- Martin van der Schans, PhD-student, per 1 september (begeleider V. Rottschäfer)

VU:
- Dr. Fetsje Bijma, UD (0,5) Stochastiek, (16 oktober 2005 – 2010)
- Dr. Marianne Jonker, UD (0,8) Stochastiek, *(september 2005 - 1 april 2010)*
- Dr. Robert Planqué, UD (0,7), *per 15 augustus 2006*

Adviseurschappen

- Dr. Geertje Hek (UvA)   naar CWI, *per 1 januari 2006*

- Dr. Vivi Rottschäfer (UL)   naar CWI, *per 1 januari 2006*

- Prof. dr. Huib de Swart (UU)   naar CWI, *per 1 januari 2006*

- Prof. dr. Aad van der Vaart (VU)   naar UL, *per 1 januari 2006*

- Prof. dr. Stephan van Gils (UT)   naar UU, *per 1 januari 2006*

- Dr. Georg Prokert (TUE)   naar VU, *per 1 september 2006*

Gasten

RUG:
- Prof. dr. Mark Levi, Penn State University USA, 10 – 15 september (Henk Broer)
- Prof. dr. Carles Simó (Johann Bernoulli professor), Universitat de Barcelona Spain
  23 januari - 18 februari en 26 juni – 12 juli (Henk Broer)
- Prof. dr. Tasso Kaper, Boston University USA, 6 -13 december (Henk Broer)
- Prof. dr. Richard Cushman, University of Calgary Canada, 11 - 17 november (Henk Broer)
- Prof. dr. Dmitrii Sadovskii, University of Dunkirk France, 14-18 november (Henk Broer)
- Prof. dr. Francesco Fasso, University of Padova Italy, 10 – 20 december (Henk Broer)

CWI:
- Prof. dr. Tasso Kaper, Boston University USA, 28 april – 4 mei en 26 juni – 1 juli (Arjen Doelman)
- Dr. Vladas Sidoravicius, IMPA Rio de Janeiro Brazil, oktober – december 2005* (Rob van der Berg)

UU:
- Prof. dr. Masayasu Mimura, University of Kawasaki Japan, eind maart (Odo Diekmann)

VU:
- Prof. dr. W.D. Kalies, Florida Atalanta University USA, april - mei (Rob van der Vorst)
- Prof. dr. David Siegmund, Stanford University USA, 16 maart - 12 juli (Mathisca de Gunst)
- Prof. dr. James Robins, Harvard University USA, 4 - 10 juli (Aad van der Vaart)

Workshops

RUG:
- 'Dynamics of Nonlinear Waves' (org.: Henk Broer, RuG, Arjen Doelman, CWI, Thierry Gallay *France*, Mariana Haragus *France*), 24- 28 april

- 'Mathematics and Earth Sciences' (org.: Henk Broer, RuG, Henk Dijkstra, IMAU, Arjen Doelman, CWI, Huib de Swart, IMAU), 28 november – 1 december

Workshops *(related)*

CWI:
'Geometric and Multiscale Methods for Geophysical Fluid Dynamics', 2-6 oktober, locatie LC (org.: Jason Frank en Onno Bokhove, UT)

VU:
'Limit Problems in Analysis', 1-5 mei, locatie LC (org.: Jan Bouwe van den Berg)

'Computational and Topology in Dynamics', 15-19 mei, locatie LC (org.: Robert van der Vorst, VU en Jan Bouwe van den Berg

'Asymptotics, Particles, Processes and Inverse Problems', 10-14 juli, locatie LC (org.: Geurt Jongbloed)

Presentaties

RUG:

Arjan van der Schaft, 'Research problems in applications of hybrid systems theory to power systems and electronics', Progress Meeting Workpackage 4 of EU Network of Excellence HYCON, Paris, January 19

Arjan van der Schaft, 'The Port-Hamiltonian Approach to Network Modeling, Analysis and Control', Three lectures IIT Bombay, February 1,2 and 3

Arjan van der Schaft, 'Geometric Network Modeling of Physical Systems', Department of Informatics, University of Rostock, Rostock, May 11

Arjan van der Schaft, 'Complex Systems Theory: Modeling, Reduction and Control', Invited Lecture 1st CASY Workshop, Bertinoro, May 22-26

Arjan van der Schaft, 'Fundamental Methods in Port-Hamiltonian Systems', Final Review Meeting EU-IST Project GEOPLEX, Brussels, May 31

Arjan van der Schaft, 'Network Modeling for Control', Invited Lecture CTS-HYCON Workshop, Paris, July 10-12

Arjan van der Schaft, 'From networks models to geometry: a new view on Hamiltonian systems', Invited Section Lecture International Congress of Mathematicians (ICM), Madrid, August 22-30

CWI:

Daan Crommelin, 'Dynamical Systems Theory and ULFV in the Atmosphere', General Assembly of the European Geosciences Union, Vienna, Austria, april

Daan Crommelin, 'Reconstrcution of Effective Stochastic Dynamics from Data', Geometric and Multiscale Methods for Geophysical Fluid Dynamics, Leiden, 2 oktober

Jens Rademacher, 'Macroscopic limits of atomic chains and modulated wave trains', Limit Problems in Analysis, Leiden, 4 mei

Jens Rademacher, 'Dynamics and Onset of Pulse Replication in Reaction Diffusion Systems at SIAM', Conference on Nonlinear Waves and Coherent Structures, Seattle, USA, 9-12 september

Antonios Zagaris, 'Analysis and opportunities for reduction methods in chemical kinetics', SIAM Conference on Numerical Combustion, 26 april

Antonios Zagaris, 'Dimension reduction algorithms - recent advances and future challenges', Limit Problems in Analysis, Leiden, 4 mei

Antonios Zagaris, 'A singularly perturbed eigenvalue problem from phytoplankton dynamics', Symposium on Resonance and Eigenvalues in Singular Perturbation Problems, 15 juni

Antonios Zagaris, 'Analysis of Reduction Methods for Multiscale Dynamics', TUE CASA colloquium, 18 oktober

UL:

Vivi Rottschäfer, 'Multi-bump, blowup solutions of the Ginzburg-Landau equation' Dynamics of Nonlinear Waves, 26 april

Vivi Rottschäfer, 'Blowup solutions of the Ginzburg-Landau equation', Limit Problems in Analysis, 2 mei

Vivi Rottschäfer, 'Formation of singularities in natural systems', General Science Faculty Seminar 'This week's discoveries', 17 oktober

Vivi Rottschäfer, 'Formation of singularities in natural systems', RUG colloqium, 14 november

VU:
Marianne Jonker, 'Linkage analysis for interval censored survival data with application to migraine data'
XXVI European Meeting of Statisticians, Torun, Polen, 26 juli

Fetsje Bijma, 'Distinguishing background processes in the space-frequency covariance matrix'
BioMag Conference 2006, Vancouver, Canada, 22 augustus

Publicaties binnen NDNS+

RUG:
Pola G, Van der Schaft AJ, and Di Benedetto MD. 'Equivalence of switching linear systems by bisimulation', *Int J of Control* **79**: 74—92, 2006.

Strubbe SN, and Van der Schaft AJ. 'Compositional modelling of stochastic hybrid systems', pp. 47--77 in *Stochastic Hybrid Systems*, eds. C.G. Cassandras, J. Lygeros, CRC Taylor & Francis, Control Engineering Series, 2006.

Van der Schaft AJ. 'Port-Hamiltonian systems: an introductory survey', pp. 1339--1365 in *Proceedings of the International Congress of Mathematicians*, Volume III, Invited Lectures, eds. Marta Sanz-Sole, Javier Soria, Juan Luis Verona, Joan Verdura, Madrid, Spain, 2006.

Strubbe SN, and Van der Schaft AJ. 'Communicating Piecewise Deterministic Markov Processes', pp. 63--106 in *Stochastic Hybrid Systems: Theory and Safety Critical Applications*, eds. Henk Blom, John Lygeros, LNCIS 337, Springer, 2006.

Blankenstein G, Ortega R, and Van der Schaft AJ. 'Matching in the Method of Controlled Lagrangians and IDA-Passivity Based Control', pp. 79--114 in *Nonlinear and Adaptive Control: Tools and Algorithms for the User* (ed. A. Astolfi), World Scientific, 2006.

Sakamoto N, and Van der Schaft AJ. 'An approximating method for the stabilizing solution of the Hamilton-Jacobi equation for integrable systems using Hamiltonian perturbation theory', pp. 5857--5862 in *Proc. 45th IEEE Conf. on Decision and Control*, San Diego, CA, USA, December 13-15, 2006.

Pasumarthy R, and Van der Schaft AJ. 'A finite-dimensional approximation of the shallow-water equation: a port-Hamiltonian approach', pp. 3984--3989 in *Proc. 45th IEEE Conf. on Decision and Control*, San Diego, CA, USA, December 13-15, 2006.

Kurula M, Van der Schaft AJ, and Zwart H.'Composition of infinite-dimensional linear Dirac-type structures', *Proc. 17th Int. Symp. Mathematical Theory of Networks and Systems*, Kyoto, Japan, July 24-28, 2006, pp. 27-32.

Eberard DE, Maschke BM, and Van der Schaft AJ. 'Energy-conserving formulation of RLC-circuits with linear resistors', *Proc. 17th Int. Symp. Mathematical Theory of Networks and Systems*, Kyoto, Japan, July 24-28, 2006, pp. 71--76.

Ligterink NE, Breedveld PC, and Van der Schaft AJ, 'Physical model reduction of interacting, continuous systems', *Proc. 17th Int. Symp. Mathematical Theory of Networks and Systems*, Kyoto, Japan, July 24-28, 2006, pp. 827-834.

Pasumarthy R, and Van der Schaft AJ. 'A port-Hamiltonian approach to modeling and interconnections of canal systems', *Proc. 17th Int. Symp. Mathematical Theory of Networks and Systems*, Kyoto, Japan, July 24-28, 2006, pp. 1436--1443.

Macchelli A, Pasumarthy R, and Van der Schaft AJ. 'Control of port-Hamiltonian systems by interconnection and energy shaping via generation of Casimir functions: an overview', in {\it *Proceedings 5th MathMod Conference*}, eds.: I. Troch, F. Breitenecker; ARGESIM Report no. 30, Vienna, February 2006.

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CWI:

Crommelin D, and Vanden-Eijnden E. 'Fitting timeseries by continuous-time markov chains: A quadratic programming approach', *J Comp Phys* **217**, 782—805, 2006.

Crommelin D, and Vanden-Eijnden E. 'Reconstruction of diffusions using spectral data from timeseries', *Comm Math Sci* **4**, 651—668, 2006.

Doelman A, Kaper T, and Peletier L. 'Homoclinic bifurcations at the onset of pulse self-replication', *J Differential Equations* **231,** 359 – 423, 2006.

Majda A, Franzke C, Fischer A, and Crommelin D. 'Distinct metastable atmospheric regimes despite nearly gaussian statistics: A paradigm model' *Proc Natl Acad Sci USA* **103**, 8309—8314, 2006.

Rademacher J. 'Geometric relations of absolute and essential spectra of wave trains' *SIAM J Appl Dyn Sys* **5**, 634—649, 2006.

Rademacher J, and Wittenberg R. 'Viscous shocks in the destabilized kuramoto-sivashinsky equation' *J Comp Nonl Dyn* **1**, 336—347, 2006.

UL:

Van der Kooij AJ, Meulman JJ, and Heiser WJ. 'Local minima in categorical multiple regression' *Computational Statistics and Data Analysis* **5**, 446-462, 2006.

Hubert LJ, Arabie P, and Meulman JJ. 'The Structural Representation of Proximity Matrices with MATLAB' *Philadelphia: ASA-SIAM*, 2006.

VU:

Van der Heijden GHM, Peletier MA, and Planqué R. 'Self-contact for rods on cylinders' *Arch Ration Mech Anal* **182**(3), 471—511, 2006.

Proefschriften / Promoties

CWI:
- Bernhard Meulenbroek (TUE): 'Streamer branching: conformal mapping and regularization' (april 2006). Promotor: U. Ebert

- Carolynne Montijn (TUE): 'Evolution of Negative Streamers in Nitrogen: a Numerical Investigation on Adaptive Grids' *(december 2005*)*. Promotor: U. Ebert

- Nguyet Nga Pham Thi (UvA), 'Numerical Analysis of Phytoplankton Dynamics' *(november 2006)*. Promotors: J.G. Verwer en J. Huisman

UvA:
- Nienke Valkhoff (UvA), 'Stabilization by Competing Instability Mechanisms', *(november 2006)*. Promotor: A. Doelman, co-promotor: G.M. Hek

VU:
- Kees Jong: 'Machine Learning for Human cancer research' *(juni 2006)*. Promotors: A.W. van der Vaart, G. Eiben, co-promotor: E. Marchior

- Pieter Trapman: 'On stochastic models for the spread of infections' *(september 2006)*. Promotors: R.W.J. Meester, J.A.P. Heesterbeek (UU)

Diversen

MRI-Stieltjes Master Class 2005/2006 *(clusterbreed)*
    'Finite and Infinite Dimensional Dynamical Systems'
    september 2005 tot juni 2006

The 55th European Study Group Mathematics with Industry (ESG155) *(grotendeels vanuit NDNS+)*
     30 januari – 3 februari, locatie TUE

Wiskundeclusters & Maatschappij *(30 november)*
-    'Tsunami modelling and simulation from excitation to run-up', Brenny van Groesen, UT
-    'Is fair-weather drowning caused by dead-water?', Leo Maas, NIOZ
-    'Nonlinear dynamics of glaciers', Hans Oerlemans, IMAU, UU

'Dynamics of Patterns' Days, *seminars* (org.: U. Ebert en G. Hek)
     8 februari, 23 mei en 19 oktober

'Nonlinear Dynamics', *seminar* (org.: H. Hanßmann en R. van der Vorst)
     8 december

De NDNS+ board

 Henk Broer
 Arjen Doelman
 Aad van der Vaart
 Sjoerd Verduyn Lunel