

BIENNIAL REPORT 2000-2001

Korteweg-de Vries Institute for Mathematics

Faculty of Science, Universiteit van Amsterdam

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Contact persons and address

Korteweg-de Vries Instituut
Universiteit van Amsterdam
Plantage Muidergracht 24
1018 TV Amsterdam
Phone + 31-20-525 5217
Email: kdv@science.uva.nl
URL: <http://www.science.uva.nl/research/math/>

Prof. dr. Tom H. Koornwinder, scientific director
Tel.: + 31-20-525 5297
Email: thk@science.uva.nl

Drs. Eveline D. de Jong, manager
Tel.: + 31-20 -25 5091
Email: ejong@science.uva.nl

Ms Evelien Wallet, secretary
Tel.: +31-20-525 5217
Email: ewallet@science.uva.nl

Management Team

Prof. dr. Tom H. Koornwinder (chair)
Dr. Henk G. Pijls
Dr. Walter Hoffmann
Drs. Eveline D. de Jong
Ms Evelien Wallet

Scientific advisory board

Prof. dr. Paul Embrechts
Department of Mathematics
ETHZ, Zürich, Switzerland

Prof. dr. Pierre Van Moerbeke
Département de Mathématique, UCL, Louvain-la-Neuve, Belgium

Prof. dr. Don Zagier
Max-Planck-Institut für Mathematik, Bonn, Germany

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Chapter 1- General information

1.1 Mission statement

The members of the KdV Institute share a love of mathematics, both pure and applied, and they feel happy when they can convey this feeling to students: to those who specialize in mathematics as well as those who need math in another discipline, and also to those who want to hear about mathematics in its historical development and as a driving force in culture. Our research ambitions are high and cover a wide area, but some choices of topics must be made. A certain coherence in those choices is important, as well as interaction with other fields such as physics, geoscience, biology, computer science, finance etc. Statistics must be explicitly mentioned as a very vital part of what we see as mathematics. There should be a substantial relationship between our excellence in research and our success in obtaining funding from outside the university. It is our aim to increase commercial activities in balance with their scientific interest.

1.2 General overview

Concerning research and academic staff there have been very positive developments at the KdV Institute during 2000 and 2001. This section gives a general overview, while the obtained results are discussed in more detail in the next chapters.

Prof. Eric Opdam, who started work on the chair of Algebraic Groups in 1999, obtained a prestigious NWO Pionier award in 2000, by which funding he can maintain until 2005 some three additional post-docs and Ph.D. students in his group.

Dr. Klaas Landsman, who is a KNAW fellow at our institute since 1997, got a two-year extension of this fellowship for the period 2000-2002. Moreover, the university created a special chair in Mathematical Physics (beside the regular chair in mathematical physics occupied by prof. Robbert Dijkgraaf), on which Landsman was appointed as a full professor in 2001.

The group in String Theory, headed by prof. Robbert Dijkgraaf (KdV Institute) and prof. Jan de Boer (appointed at ITFA in 2000) has now got a formal status as a joint research group of both institutes. The group will soon be strengthened by dr. Kostas Skenderis, who got a NWO 'Vernieuwingsimpuls' grant in 2001. In the present biennial report it was not yet possible to include the publications of the members of the group coming from ITFA. In the next annual report a full account of the output of the group will be given.

Prof. Piet van der Houwen retired in 2000 from the chair of Numerical Analysis (a special chair, one day a week, on behalf of the foundation 'Stichting voor Hoger Onderwijs in de Toegepaste Wiskunde'). His 25 years of professorship resulted in an impressive list of Ph.D. theses under his direction, while he also taught a large number of advanced courses. Also in 2000 the foundation appointed dr. Jan Verwer (CWI) on this chair.

In Industrial Statistics the KdV Institute closely collaborates with the in-house company IBIS-UvA-BV. As a spin-off of this collaboration prof. Søren Bisgaard was appointed on a special part-time professorship at the KdV Institute.

Beside Landsman, two more KNAW fellows started working at the KdV Institute. Dr. Ben Moonen, working in algebraic geometry, started at UvA in 2001 in a two-year continuation of his three-year KNAW fellowship at UU. This will be followed by a tenured UD (assistant professor) position here. Dr. Jasper Stokman started in 2000 as a three-year KNAW fellow in Opdam's group.

As is the case in general in Dutch mathematics, the number of female tenured academic staff members is low at the KdV Institute (although a higher percentage of women is to be seen among Ph.D. students). Within a few years two of our three women faculty members retired, but we are happy to have hired Geertje Hek working in Applied Analysis and Dynamical Systems, first as a post-doc, to be followed by a tenured UD position with four-year support of NWO. Beside her research position, she works as part-time assistant director, in teaching administration, managing the studies in mathematics and physics.

The number of Ph.D. students at the KdV Institute, supported from various sources, has increased. These enthusiastic and bright young people enliven the atmosphere at the institute. They have set up the Friday afternoon colloquium, especially aimed at their group and at advanced undergraduates and young post-docs.

The faculty WINS (mathematics, computer science, physics and astronomy), to which the KdV Institute belonged, merged in January 2000 with the faculties of Chemistry and of Biology into the faculty of Science. So this biennial report tells about the first two years in the larger faculty. The KdV Institute has welcomed this merging because of the better possibilities for collaboration in research and teaching (although mathematics should not only interact with the natural sciences, but also with some of the social sciences like economics and psychology). However, negative effects have become evident in the form of cuts of the institute budget and of the library budget, and of diminished computer support.

The institute went through a difficult period in management support, because of retirements and long term illness at the secretariat. This caused much strain on the academic staff members involved in management. By now, due to new appointments, managerial and secretarial support is satisfactory again.

Although the KdV Institute is formally a research institute, teaching remains an important task for its members. The institute is pleased about the new way the faculty has set up the management of teaching. The studies in mathematics and physics are directed by prof. Chris van Weert, with the assistance of dr. Geertje Hek. Within the KdV Institute dr. Henk Pijls has an important task in the coordination of teaching activities, while a teaching committee ('opleidingscommissie') chaired by prof. Arjen Doelman designs the new curriculum and discusses, together with student representatives, the recent performance by teachers and students.

Many members of the academic staff were involved in setting up new programs in the bachelor-master structure, which will formally start in 2003, although the master programs will already

start informally in 2002. It is the intention that master programs in mathematics and in stochastics and financial mathematics will be offered in collaboration with the Vrije Universiteit Amsterdam (VUA), while a master program in mathematical physics will be presented together with the ITFA.

Teaching by institute members also involves math teaching to students in other disciplines than mathematics and physics, for instance computer science. For various reasons we consider these outside teaching activities as very important and we are trying to extend them.

1.3 Scientific Advisory Board and other evaluations

The members of the Scientific Advisory Board are P. Embrechts, P. van Moerbeke and D. Zagier (see also page 2 of this report). The Advisory Board made site visits to the Institute in January 1999, December 1999 and February 2002. The large time interval between the last two site visits is a consequence of the fact that the Faculty of Science wanted to formulate new rules concerning the Advisory Boards of its research institutes.

During the last site visit the Advisory Board spoke with most project leaders individually, and also with the institute director and with the dean of the faculty. The Advisory Board has presented a report to the dean and the institute director which is based on their impressions during this site visit and on the material supplied to them before their visit.

The report is very positive about the performance of the research groups - some of the groups are even called excellent - and gives some helpful advice about the future focus of the research groups. The report is also positive about the general management and the research management of the institute, but it is critical about the support and facilities provided by the faculty.

The previous VSNU research evaluation of mathematics took place in 1996. The next one will be in the fall of 2002. A VSNU teaching evaluation of mathematics took place in January 2002.

In the October 2001 special issue of Elsevier magazine devoted to Dutch universities, UvA ended as second best of the mathematics studies at general Dutch universities (based on a questionnaire sent to Dutch professors, where they had to exclude their own university).

Chapter 2 - Research

The KdV Institute distinguishes three research programs:

- Pure Mathematics and Mathematical Physics
- Dynamical Systems and Numerical Analysis
- Stochastics

The first of these is divided into four subprograms. There is a further subdivision of (sub)programs into projects.

A special theme ‘Financial Mathematics’ is shared by the programs ‘Dynamical Systems and Numerical Analysis’ and ‘Stochastics’. Finally, the Institute collaborates with other institutes in research on didactics. Altogether we have the following scheme:

- Pure Mathematics and Mathematical Physics
 - Algebra and Geometry
 - Algebraic Geometry
 - Algebraic Groups
 - (Finite) Group Theory
 - Analysis
 - Lie Theory and Special Functions
 - Complex Analysis
 - Mathematical Physics
 - String Theory (jointly with ITFA)
 - Quantization and Operator Algebras
 - Geometric algebra (jointly with IAS-group)
 - Discrete Mathematics
- Dynamical Systems and Numerical Analysis
 - Applied Analysis and Dynamical Systems
 - Numerical Analysis
- Stochastics
 - Mathematical Statistics
 - Industrial Statistics
 - Probability Theory
- Special theme
 - Financial Mathematics
- Other Research
 - Didactics (jointly with Amstel Institute and ILO)

2.1 Algebra and Geometry

2.1.1 Algebraic Geometry

The algebraic geometry group received a strong impulse when Moonen joined the group in 2001. He received a two-year KNAW fellowship (a continuation of his three-year KNAW fellowship at UU) which will be followed by a tenured appointment.

A highlight in the research has been the Ph.D. thesis of G. Farkas in which he proved some beautiful results on the Brill-Noether theory on curves. As a result he was able to show that the moduli space of curves of genus 23 had Kodaira-dimension > 1 .

Another highlight was the result of T. Ekedahl (Stockholm) and Van der Geer on the top Chern class of the Hodge bundle on the moduli space of principally polarized abelian varieties. This class is torsion. They limit the order of the torsion, and they give an explicit cycle that realizes the top Chern class.

Van der Geer and T. Katsura (Tokyo) introduced an invariant for varieties in positive characteristic. This invariant generalizes the a -number of abelian varieties in positive characteristic.

Van der Geer and M. Van der Vlugt (UL) analyzed coset weight distributions of BCH codes and disproved a conjecture of Charpin and Zinoviev, using algebraic curves. They also constructed an asymptotically good tower of curves over the finite field with 8 elements. Explicit good towers were so far only known for even degree extensions of the prime field.

At the moment the most fascinating development is the study by C. Faber (Stockholm) and Van der Geer of the cohomology of local systems on the moduli space of abelian surfaces. They are able to describe the cohomology of all local systems of weight less than or equal to 16 on this moduli space. They discovered a new motive of rank 4 which one can view as an analogue of the motive defined by the weight 12 elliptic cusp form Δ .

T. Katsura (University of Tokyo) visited the institute for one month in 2001. Other guests were E. Izadi (University of Georgia, Athens) for eight months, starting October 2001, and R. Schoof (University of Rome II) for two months in 2001.

Together with H. Stichtenoth (Essen) and V.J. Kumar (CalTech), Van der Geer organized in May 2000 a conference in Oberwolfach on the subject of coding theory. In July 2000, Schoof and Van der Geer organized a summer course in Anogia (Greece) on the subject of curves and abelian varieties over finite fields. In the fall of 2000, Moonen and Van der Geer organized an intercity seminar (alternating between the Universities of Amsterdam, Utrecht and Nijmegen) on the subject of curves over number fields. Van der Geer was invited to organize a mini-symposium at the European Congress of Mathematicians in Barcelona in 2000, and to give a survey talk there. In September 2001 Van der Geer organized a small workshop at the UvA on Arakelov Theory.

2.1.2 Algebraic Groups

In July 2000 the NWO Pionier project ‘Symmetry and symmetry breaking in mathematics and mathematical physics’ (Opdam) has started. De Jeu and Moree joined the Pionier project as post-doctoral fellows. In February 2000 Stokman started to work in Opdam’s group with a KNAW-fellowship.

Opdam proved the Plancherel formula for affine Hecke algebras. This result has several applications for the Langlands parametrization of discrete series representations of p -adic reductive groups. It also opens possibilities to study completions of Hecke algebras, and to apply ideas from noncommutative geometry to these completions. This sheds new light on various problems in the harmonic analysis of p -adic groups.

Opdam and M. Reeder (Boston) started a study of the K -theory of the Schwartz completion of the affine Hecke algebra. The Euler-Poincaré pairing on the modules of finite length plays a crucial role. This pairing was shown to depend only on the restriction of the modules to the finite dimensional semisimple subalgebras of the Hecke algebra.

Opdam and Rouquier (Paris) have proved the generic semisimplicity of the category of lowest weight modules of the symplectic reflection algebras that were introduced by Etingof and Ginzburg. Berest, Etingof and Ginzburg have already applied this result in order to prove various conjectures about quasi-invariants of reflections groups.

De Jeu developed a radically new and general approach to describe the closure of modules over the polynomials or trigonometric functions in a large variety of practical situations. As a side result a new criterion for the determinacy of multidimensional probability measures was obtained.

Stokman has established algebraic proofs of the Plancherel formula and inversion formula of the Askey-Wilson function transform. This opens the way to higher dimensional generalizations of the Askey-Wilson function transform.

Moree has proved special cases of the Schmutz-Schaller conjecture. He also started collaboration with H. te Riele (CWI) to analyze the higher moments of the Riemann zeta function in the light of random matrix theory.

M. Reeder (Boston College, USA) stayed for one month at the KdV Institute during October-November 2001 as guest of Opdam. He gave several talks about the Langlands program.

Opdam was an invited speaker at the European Mathematical Congress in Barcelona 2000, and at various other international conferences in representation theory. Opdam and Stokman, as well as Koornwinder (see 2.2.1), participated intensely in the program ‘Symmetric functions and Macdonald polynomials’ which was organized at the Isaac Newton Institute in Cambridge, UK from January 2001 to July 2001. Opdam delivered two lecture series at this occasion. Opdam and Koornwinder stayed there as long term visitors. Stokman delivered a 4-hour course at the SIAG OP-SF summer school 2000 ‘Orthogonal Polynomials and Special Functions’, Laredo, Spain.

Opdam and Koornwinder belonged to the organizers of the 2000 and the 2001 sessions of the annual Twente conference on Lie groups and representation theory.

2.1.3 Finite Group Theory

During the years 1999-2001 a full classification was carried out of those finite groups of which the abelian subgroups of equal order are conjugate. A paper on this subject has been submitted by Van der Waall jointly with S. Sezer (Eastern Mediterranean University of Northern Cyprus), who visited the KdV Institute in June 2000 and in September 2000, with financial support of NWO.

Van der Waall is the local coordinator of an Erasmus/Socrates agreement with Athens (Greece) In 2000 and 2001 five Greek students from Athens visited the KdV Institute under this agreement.

2.2 Analysis

2.2.1 Lie Theory and Special Functions

Koornwinder directed, jointly with N.M. Temme (CWI), a two-year NWO post-doc project 'Algorithmic Methods for Special Functions by Computer Algebra', which was performed by R. Vidunas. A Maple procedure that sums infinite hypergeometric series by Zeilberger's algorithm combined with asymptotic techniques, will be one of the deliverables.

Another collaboration of Koornwinder with Temme was successfully concluded with the thesis defense in February 2000 by their joint Ph.D. student P.J. Oonincx, who worked in a STW project on signal analysis at CWI.

Jointly with R. Koekoek (TUD) and R.F. Swarttouw (VUA), Koornwinder is preparing two chapters on orthogonal polynomials for the NIST Digital Library of Mathematical Functions (DLMF). These will become part of a book (both hardcopy and electronic) which will be the successor of Abramowitz and Stegun, Handbook of Mathematical Functions. The project is coordinated at the institute NIST (Maryland, USA). Koornwinder acknowledges hospitality at CWI for a few days per month during one year, starting July 2001, while working on this project.

Hendriksen has an ongoing collaboration with Bultheel (Leuven, Belgium), González-Vera (La Laguna, Canary Islands, Spain), and Njåstad (Trondheim, Norway) on orthogonal rational functions and rational approximation theory, with a steady output of 3 or 4 papers/year.

During 2000 and 2001 Koornwinder organized three Lie days (one-day sessions with lectures on Lie theory). Jointly with M.A. Kaashoek (VUA), E. Koelink (TUD) and Wiegerinck he organized in 2000 a seminar 'Orthogonal Polynomials and Random Matrices', which brought together pure analysts and Lie theorists. Jointly with E. Koelink (TUD) he organized at the KdV Institute an NWO sponsored two-day international workshop on 'Applications of Dynamical Quantum Groups and the KZ equation' in September 2001.

Koornwinder was a member of the International Organizing Committee of the NATO Advanced Study Institute ‘Special Functions 2000: Current Perspective and Future Directions’, which was held during two weeks in May, June 2000 in Tempe, Arizona, USA.

2.2.2 *Complex Analysis*

The graduate work of Lemmers on Gleason's problem, as well as that of Beneker on the boundary of the unit ball in H^1 , was completed. Both will obtain their Ph.D. in 2002.

Wiegerinck proved that the graph of $\exp(1/z)$ is complete in the sense of pluripotential theory. The same is true for many related analytic functions. This solves a 20 year old problem originating with Sadullaev. This result is in line with a conjecture of Levenberg, Martin and Poletsky, that graphs of holomorphic functions on their natural domain of existence are complete pluripolar. The conjecture gives rise to a fascinating set of problems. Work in progress of Edigarian (Krakow) and Wiegerinck shows that it is false in general, and indicates obstructions to the conjecture as well as some sufficient conditions.

Jointly with Doelman and Koornwinder and with support of NWO, Wiegerinck organized the Stieltjes analysis colloquium in 2001.

2.3 Mathematical Physics

2.3.1 *String Theory (jointly with IFTA)*

The String Theory group at the University of Amsterdam is a common initiative of the Institute for Theoretical Physics (ITFA) and the KdV Institute. It receives additional funds from the University Board through the Center of Mathematical Physics Amsterdam (CMPA, Dijkgraaf director), and external funding by FOM and NWO (GBE-Mathematics). The group is at this moment mainly located at the ITFA, but will be given a more integrated housing once the move to the Watergraafsmeer campus is completed.

The UvA has supported string theory and related areas since 1992, both from the mathematics and physics side, when it created, as first institution in the Netherlands, permanent positions in this field (Dijkgraaf 1992, H.Verlinde 1994). With the aid of a NWO Pionier grant a number of infrastructure investments have been made. String theory is an important research theme in the research program of both the ITFA and the KdV Institute and acts furthermore as the backbone of the CMPA.

String theory has a strong impact on and interaction with mathematics. This has been particularly encouraged in Amsterdam, and is reflected in the research profile at the KdV Institute. The recent appointments of Opdam and Landsman have strengthened this relation.

In 2000 J. de Boer was appointed at the ITFA to the position vacated by H.Verlinde, who moved to Princeton. Other connections at the ITFA are Schoutens, Pruisken, Nienhuis in conformal field theory, integrable systems in condensed matter systems, and statistical mechanics, and Bais, Smit, Gaemers in high-energy particle physics and cosmology. There are also good connections

with the NIKHEF theory group (Schellekens, van Holten) and Utrecht University ('t Hooft, de Wit, Vandoren, Loll).

In 2001 a successful application was put in for a NWO Vernieuwingsimpuls grant (700k euro) for K. Skenderis, who is presently Assistant Professor in the High Energy Theory group at Princeton University. He is an all-round string theorist who has done particularly important work in AdS/CFT dualities and geometrical interpretations of renormalization group flows. He obtained his Ph.D. with P. van Nieuwenhuizen at Stony Brook and has held post-doctoral positions at Leuven and Utrecht. Skenderis' project will start September 2002. His grant will partly be used to finance post-docs and graduate students.

The Executive Board of FOM approved a new research program 'String Theory and Quantum Gravity' meant to stimulate the national research effort in this field. The program will run for 8 years with a budget of 4M euro. Dijkgraaf is program manager. For the Amsterdam group this means structural support for one post-doc and one Ph.D. student during 8 years, plus the possibility to obtain additional projects in the open competition (first round summer 2002).

De Boer and Dijkgraaf obtained a three-year post-doc project in the biennial project competition of the FOM/GBE Mathematical Physics program. Slava Rychkov, a student of Polyakov (Princeton), will fill this position.

In the summer of 2001 the String Theory group organized the annual Amsterdam Summer Workshop String Theory and Quantum Gravity for the fourth time. Again we were able to attract a large group of world experts to Amsterdam (among others Harvey, Martinec, Kutasov, Silverstein, Kachru) to give extensive lectures and interact with our post-docs and students. This workshop was organized by Bais, de Boer, Dijkgraaf and E. and H. Verlinde, and is an important part of the activities of the CMPA. The recently approved FOM program String Theory and Quantum Gravity has explicitly reserved funds for a continuation of this series of workshops.

In 2001 a very successful national course in String Theory for advanced undergraduate and graduate students was given in Amsterdam. The course started with more than 50 students from many Dutch universities. Several students continued their research as graduate students.

2.3.2 Quantization and Operator Algebras

The general program concerns the interaction between operator algebras, noncommutative geometry, quantization theory, and quantum field theory. Techniques from Lie groupoids and category theory play an important role as well. A wide range of applications within mathematical physics is being studied.

Landsman was appointed to a full professorship as from July 1, 2001. His inaugural lecture on October 15th focused on the role of John von Neumann as his proposed candidate for the title of 'person of the 20th Century'. In June 2002, Landsman will have completed a three- plus two-years KNAW fellowship. For two more years his position will be supported to a large extent by a FOM 'dakpan' grant.

Landsman's mathematical work focused on the possible functoriality of quantization. Fascinating connections between this program and Atiyah-Singer index theory came to light. An

organizational highlight was the MSRI Workshop on Quantization and Noncommutative Geometry at Berkeley in April 2001, which Landsman co-organized with Fields Medallist Alain Connes and others. At a national level, the Seminar on Geometry and Quantization, which Landsman organized with Moerdijk (UU), drew a large audience. Also, the Proceedings of an Oberwolfach meeting in 1999 on ‘Deformation Quantization of Singular Symplectic Quotients’ appeared in 2001, co-edited by Landsman.

All three research proposals for external funding to this project were successful, leading to the appointments of two post-docs and one Ph.D. student (the latter to arrive in 2002). Moreover, Landsman’s Pioneer proposal to NWO, formulated in the summer of 2001, was approved in early 2002.

Kuckert (post-doc) opened a new approach to vacuum and thermal states in quantum field theory, possibly leading to a better understanding of black hole physics. He left at the end of 2001 to take up a prestigious Emmy Noether fellowship in his home country Germany. Posthuma (Ph.D. student) made considerable progress in his program of proving that quantization commutes with reduction in the setting of loop group actions. He is expected to finish his thesis work by the end of 2002.

Müger (post-doc) came to Landsman’s group in July 2001 to work on the interaction between quantum field theory, operator algebras, and category theory. The eventual goal of his appointment is to support work on quantum groupoids and related structures. This is a joint NWO appointment with Moerdijk at Utrecht. Müger turns out to be extremely productive: within half a year he has already written three long and difficult papers, with two further ones, totaling a hundred pages, about to be completed.

2.3.3 Geometric Algebra (jointly with IAS-group)

This project is an interdisciplinary cooperation between mathematics (Pijls) and computer science (L. Dorst, IAS-group) and its aim is to develop software for a geometry toolbox for computer scientists working in robotics and computer graphics.

It turns out that Geometric Algebra based on Clifford Algebra provides a new and unified way of ‘doing geometry’. The relevant operations in geometry need to be formulated in terms of Geometric Algebra in order to make them suitable for the applications in computer science. Pijls and Dorst jointly advise the Ph.D. student Bouma in this project.

The following results were obtained:

- the subspace operations (such as meet and join) and the projection operators were formulated in terms of geometric algebra;
- Bouma obtained some unifying results about versors and projection operators.

2.4 Discrete Mathematics

We found that the class of graphs not containing certain subdivisions of K_4 are strongly t-perfect. This bears upon the stability number of a graph (the maximum number of pairwise nonadjacent

nodes), and applies to frequency assignment. The paper will appear in SIAM J. Discrete Math. Moreover, short proofs were found of theorems of Mader and Guenin. They will appear in J. Combinatorial Theory, Series B. During leaves at Microsoft Research (Redmond, WA, USA), with L. Lovász new connections between the embeddability of graphs and eigenvalue properties of associated matrices were found.

A Ph.D. project application at NWO was granted, and Gijswijt started to perform his Ph.D. research in this project in September 2001.

2.5 Dynamical Systems and Numerical Analysis

In 2000 Applied Analysis and Numerical Analysis merged into one bigger program ‘Dynamical systems and Numerical Analysis’.

2.5.1 Applied Analysis and Dynamical Systems

In 2000 Homburg was appointed as a tenured UD (assistant professor) in this project, while Hek joined the group as a post-doc.

Together with H. Kokubu (Kyoto) and V. Naudot (Diepenbeek), Homburg has been able to show the existence of homoclinic-doubling cascades in two-parameter families of three-dimensional vector fields. This truly is a breakthrough result. Moreover, in joint work with Young (Ohio), Homburg also recovered the universal scaling behavior of these cascades.

In a series of papers with R.A. Gardner (Amherst) and T.J. Kaper (Boston), Doelman has extended the Evans function approach to a general theory by which the stability of pulses to singularly perturbed reaction-diffusion equations can be established.

Doelman and Hek developed, together with W. Eckhaus (UU), Ph. Holmes (Princeton) and T.J. Kaper (Boston), a geometric method by which the extremely rich structure of singular patterns in reaction-diffusion equations can be unraveled. This method can also be used to describe the semi-strong interaction of pulses.

De Vilder is applying dynamical systems to financial mathematics and has initiated a promising cooperation project in financial mathematics with the Amsterdam based company AOT (for his activities see 2.7 Financial Mathematics).

The Applied Analysis and Dynamical Systems group has been involved in the organization of the ‘Symposium on Nonlinear Systems’ at the University of Twente (organized by Doelman and D. Lohse, UT). The aim of this and following meetings (the next one will be in 2002) is to provide a structure that enables nonlinear scientists to meet regularly. The meetings are supposed to bring together physicists, mathematicians, biologists, chemists, oceanographers, meteorologists and engineers who are studying high-dimensional nonlinear systems and nonlinear partial differential equations. The main focus is on providing a basis at which Dutch scientists of this field can meet and communicate. The symposium was very successful.

The group has also been involved in numerous other activities, of which we only mention the regular seminar ‘Nonlinearity in Amsterdam’ (jointly organized with groups at the CWI and the VUA) and the two-week workshop ‘Patterns and Waves - Mathematics and Nonlinear Chemistry’ at the Lorentz Center in Leiden, organized by Doelman and Y. Nishiura (Sapporo).

Doelman is editor of the journal ‘Physica D (Nonlinear Phenomena)’; this is a leading multi-disciplinary journal in the field of nonlinear dynamics. Apart from various other memberships and activities, Doelman has also been member of the committee that organized the (American) math Awareness Month ‘Mathematics and the Ocean’ (see <http://mathforum.com/mam/01/>).

2.5.2 Numerical Analysis

In 2000 Van de Houwen retired as a professor in Numerical Analysis on behalf of the foundation SHOTW (see 2.10). Next, the foundation appointed Verwer on this chair. As was the case with Van der Houwen, Verwer has a position as senior researcher at the CWI.

The main theme in Verwer’s group is ‘Numerical Analysis of Evolutionary Differential Equations’. Problems that lead to such equations occur in a wide variety of application fields. Various projects in this area have been guided by Verwer. His major interest has been in problems connected with atmospheric air pollution modeling. Recently he started to work on advection-diffusion-reaction problems found in biological applications. A common property in these problems is the occurrence of slow and fast solution components, multiple space dimensions, linear and nonlinear terms, and possibly many components. Hence the problems are large-scale and exhibit widely varying temporal and spatial scales.

With W. Hundsdorfer (CWI) and J.G. Blom(CWI) Verwer published a notable survey on numerical time integration for air pollution models. Also with W. Hundsdorfer, Verwer is writing a book on the numerical solution of advection-diffusion-reaction equations. Publication is planned in 2003.

In Hemker’s group, much progress has been made recently in the related fields:

- (1) hierarchical approximations (wavelets, nested spaces),
- (2) discrete system solvers with optimal complexity (multigrid),
- (3) self-adaptive finite-element methods,
- (4) affordable approximation in more dimensions (sparse grids),
- (5) defect correction and a-posteriori error estimators.

And finally, (6) recent work in the field of discontinuous Galerkin methods for elliptic problems (Baumann, Babuska, Oden) led to a breakthrough in high-order conservative discretisation.

Proper combination of the afore mentioned issues led to the investigation of using high-order discontinuous Galerkin methods for the construction of a hierarchical self-adaptive solver for convection dominated flows in three dimensions. This very ambitious endeavor initiated a number of Ph.D. projects guided by Hemker. One of these projects, with participation of Hoffmann and Pfluger will lead to a doctoral dissertation by Van Raalte. In this research we restrict ourselves to typical flow problems eventually described by the Navier-Stokes equations.

A highlight this year was the organization by Hemker of the IFIP WG 2.5 Meeting and Workshop at UvA in May 2001, which was followed by a Symposium on Scientific Computing and the Computational Sciences, CWI and UvA.

2.6 Stochastics

Apart from fruitful results in traditional topics, the research of our stochastics group has two remarkable characteristics. Consultancy and applied research within the Industrial Statistics group triggers new developments in Mathematical Statistical research, and mainly within the Probability Theory group there is a substantial research effort in Financial Mathematics (see 2.7.1).

Furthermore, it should be noted that eight Ph.D. projects have been completed successfully in the period 2000-2001.

2.6.1 *Mathematical Statistics*

Traditional acceptance sampling plans neglect past performance. The concept of credit has been introduced into this field, simple acceptance sampling strategies have been developed, and they have been proved to have the desired performance; see Klaassen (Technometrics, 2001); this approach has been implemented already in a British Standard in June 2001, namely BS 6001-7.

Another example of the fruitful interaction between industrial and mathematical statistics within the group is the research on cross sectional sampling, that was triggered by a consultancy project. It shows the practical relevance of cross sectional samples in survival analysis, and resulted in a paper by Van Es et. al. (2000) and in a Ph.D.-project. Our research shows that the accelerated failure time model is preferable under cross sectional sampling over the celebrated Cox model (Cox (1972) has over 14000 citations).

As a final example we mention the Ph.D. thesis of Ion, that covers topics from all three subgroups of our research group.

Another highlight is the publication in 2001 of ‘State of the Art in Probability and Statistics’, co-edited by Klaassen, with 24 papers by the crème de la crème of the stochastics community, which were presented at a symposium in Leiden organized in honor of W.R. van Zwet in 1999.

Furthermore, Klaassen is Chairman of the Publications Committee of the International Statistical Institute (ISI) and member of the Scientific Advisory Committee of the Netherlands Forensic Institute (NFI). Finally, members of the group participated in the projects INTAS-Georgia 97-1828 and the European DYNSTOCH-project: Statistical Methods for Dynamical Stochastic Models, which started in 2000 and of which Spreij is the local coordinator.

2.6.2 *Industrial Statistics*

The research work in industrial statistics is coordinated by the Institute for Business and Industrial Statistics (IBIS UvA). This institute combines scientific research with consultancy activities. IBIS UvA aims to make valuable contributions to the scientific development of

industrial statistics. The scientific staff members of the institute spend about 40% of their time doing research aimed at publication. IBIS UvA also supervises and sponsors Ph.D. research. The background to the research activities is that the combination of scientific research and its application in consultancy activities results in interesting interactions. Many topics for research have been inspired by problems encountered in practice, whereas clients in industry have immediate benefits from the results of research. On the whole, the number of publications has never been so high as during the last few years.

During the last decade, attention in quality control – the application area of industrial statistics – has shifted from Statistical Process Control (SPC) to the Six Sigma program, a methodology for conducting improvement projects based on statistical investigation. As a result, the research done at IBIS UvA, which used to be focused on SPC and control charts, has evolved in the direction of topics that play a role in the Six Sigma methodology.

A second development is that IBIS UvA has managed to establish itself in a central position in an international network for industrial statistics, called ENBIS. This network has led to several interesting collaborations, the most important of which is that Bisgaard, who is an internationally known and regarded statistician, has accepted a part-time professorship at the KdV Institute. In 2001 the network was successful with a proposal for financial support from the European Union.

The topics that IBIS UvA has traditionally been good at – control charts and SPC – are still a subject of research. Three theses on process control and improvement were successfully defended in the last two years: Trip (2000), Schippers (2000) and Ion (2001). Statistical methods for the evaluation of measurement systems have been the subject of research at the institute for several years now. The research on continuous measurements being completed, the attention has shifted to measurement systems for categorical (especially binary) variables. This is the subject of ongoing Ph.D. research.

Research in industrial statistics necessarily involves extra-mathematical topics, especially in methodology. This type of research has as its subject the coherence between and applicability of techniques. The objective is to arrive at methodological rules for improvement projects and for the application of statistical methods in quality improvement.

In 2000, Does was keynote speaker on the Annual Meeting of the Austrian Statistical Society in Innsbruck, Austria, and keynote speaker on the 44th European Organisation for Quality Congress in Budapest, Hungary.

2.6.3 Probability Theory

Queuing processes break down if the expected service time exceeds the expected interarrival time. However, even if the expected service time is infinite, the time to break down may be very long. This surprising result is of interest to computer systems with overcapacity and has been published by Balkema and Verwijmeren.

Balkema in collaboration with Resnick (Cornell) and Klüppelberg (München) has obtained a complete description of the domains of attraction of the limit laws for exponential families. This leads to an extension of Karamata's well-known Tauberian theorem for Laplace transforms.

Keane in collaboration with S.W.W. Rolles (Eurandom) has obtained new results on random walks in random environments and very explicit results on limit laws for reinforced random walks.

Keane has been advisor for Philips Research Laboratories, Eindhoven, for many years. In November 2001 this affiliation was renewed in a contract between Philips and the KdV Institute. Keane is also advisor of Hewlett Packard Laboratories, Bristol, UK, as well as advisor and member of the International Panel, Eurandom, Eindhoven.

Spreij has been organizer of the Workshop on Hellinger Integrals and Hellinger Processes, Helsinki (2001).

2.7 Special theme

2.7.1 Financial Mathematics

During the past four years there have been efforts to initiate research in the area of Financial Mathematics by the Stochastics group in cooperation with De Vilder of the Dynamical Systems group. The Colloquium 'Probability Theory, Statistics and Financial Mathematics' has been devoted to topics in financial mathematics. The topic for this year is volatility, for the previous year it was risk theory. De Vilder started a research group on random dynamical systems which also attracted people from the Departments of Psychology and of Econometrics. A proposal for granting continued and extended collaboration on this topic has been submitted to the Board of UvA.

Spreij is working on martingales, point processes and diffusions in finance, in particular on estimation problems. In collaboration with Van Zanten and K. Dzjaparidze (CWI), he has worked on problems associated with martingale and diffusion models for financial processes.

Balkema, in collaboration with P. Embrechts (Zürich) is working on multivariate limit distributions for high risk scenarios, extending univariate results of De Haan and himself from the late '70s.

There are two Ph.D. students in financial mathematics, Peters and Bogouslavskaja. Peters is working on volatility. He has used high frequency data from the Dutch AEX stock index, and more recently from the S & P futures index, to obtain a better understanding of volatility. It has been shown that one may use volatility to define financial time. In terms of financial time daily increments of the AEX are normal variables. These results have been used to give a critical analysis of Garch and Egarch models. This project has been financially supported by IMG Holland NV until June 2001 and by AOT NV from then on. De Vilder has initiated discussions with AOT NV for further collaboration between this company and the KdV Institute.

Bogouslavskaja is working on optimal control of stochastic (investment) processes. By using special functions and group theory she is able to obtain explicit solutions in the univariate setting.

Spreij was organizer of a one-week intensive Stieltjes course in Financial Mathematics (2001); organizer of the Winter School on Terms Structure and Risk Measures in Noordwijkerhout in 2001; interim director of the commercial initiative 'Financial Mathematics Amsterdam' (FWA, (jointly with VUA and CWI), and he is the leader of the Stieltjes Theme group 'Financial Mathematics'. He also organized a session on Financial Mathematics at the Dutch Mathematical Congress in 2001.

2.8 Colloquiums

2.8.1 General Mathematics Colloquium

Traditionally the General Mathematics Colloquium takes place on Wednesday mornings. Each academic year, between 25 and 30 lectures are scheduled with speakers from the KdV Institute itself, as well as from other Dutch (mathematics or mathematics related) institutes or from abroad. In particular, guests from abroad who are staying at the KdV Institute for a shorter or longer period of time are invited to lecture in the colloquium. Furthermore, most defendants of a Ph.D. thesis in mathematics at the UvA are invited to give a lecture in the colloquium briefly before their thesis defense.

The audience of the colloquium consists on average of 20-30 people. The colloquium thus forms an outstanding platform for the lecturers to disseminate to the institute new developments in all branches of mathematics as well as surveys of mathematical methods that are currently 'en vogue'.

During the academic year 1999-2000 the colloquium was organized by Doelman and Koorwinder. In the academic year 2000-2001 the organizers were Stokman and Spreij, whereas in the current academic year 2001-2002 it is organized by De Jeu and Spreij. The list of past lectures can be found on <http://www.science.uva.nl/research/math/colloq/>.

Since a few years, a new tradition has developed that after the lecture the speaker and everybody at the institute who wants to join have lunch in the 'common room' of the institute.

2.8.2 Friday afternoon colloquium

This colloquium is aimed at and organized by the graduate students, advanced undergraduate students and post-docs at the institute. It started in the beginning of 2001. It meets usually biweekly on late Friday afternoons. There were 16 sessions during 2001 and it was organized by Nuyens and Gijswijt.

See the full list of lectures on <http://turing.wins.uva.nl/~mnuyens/vmc.html>.

2.9 Compositio Mathematica

In the past several years, but especially in the last one, Van der Geer as the managing editor of *Compositio Mathematica*, a prestigious journal for mathematics, spent time and energy in finding a new publisher for the journal. As a result, the journal will be published by the London

Mathematical Society as of 2004. It is expected that this will result in lower prices and better electronic availability. The new URL of the journal is <http://www.compositio.nl>.

2.10 Foundation ‘Stichting voor Hoger Onderwijs in de Toegepaste Wiskunde’

The Foundation for Higher Education in Applied Mathematics was founded on March 17, 1948. Its aim is to establish chairs in applied mathematics at the UvA or at other Dutch universities.

P.J. van der Houwen retired on September 1, 2000 as the fifth in a row of professors at the UvA on behalf of this foundation. He had occupied this chair during 25 years. In 2000, new members for the board of the foundation and for the curatorium of the chair were appointed. From the, KdV Institute, Koornwinder is secretary and treasurer of the board, and Doelman is secretary of the curatorium.

The board and curatorium selected dr. J.G. Verwer (CWI) as a candidate to become the sixth professor of the chair and the board of UvA endorsed this appointment. Verwer started in this position (1 day/week) on December 1, 2000. His field, like that of Van der Houwen, is numerical analysis. He delivered his inaugural lecture on December 7, 2001.

See <http://www.science.uva.nl/research/math/SHOTW/> for further information about the foundation.

2.11 Thomas Stieltjes Institute for Mathematics

The Thomas Stieltjes Institute for Mathematics is a Dutch research institute in mathematics (inter-university research school), in which participate, University of Amsterdam (UvA), Free University Amsterdam (VUA), Delft University of Technology (TUD), Eindhoven University of Technology (TUE), University of Leiden (UL), and the Erasmus University Rotterdam (EUR). The institute collaborates with the CWI in Amsterdam and with Eurandom in Eindhoven. The University of Leiden is administrator (‘penvoerder’) of the Institute.

The Stieltjes Institute was founded the 12th of November 1992 and carries out research in four main areas of fundamental and applied mathematics: Algebra & Geometry, Analysis, Stochastics, and Operation Research. The Institute has a research training program for Ph.D. students and has received formal recognition as a research school (‘onderzoekschool’) from the KNAW. Further information: <http://www.stieltjes.org>

On behalf of the UvA, Koornwinder is a member of the Board of the Stieltjes Institute. He is also chairman of the Science Committee. In various research projects within the Stieltjes Institute, researchers from the KdV Institute act as project leaders:

- Geometry (van der Geer and Dijkgraaf)
- Representation Theory, Operator Algebras and Complex Analysis (Opdam)
- Differential Equations, Dynamical Systems and Numerical Analysis (Doelman jointly with C.J. van Duijn, TUE)
- Theme group on Financial Mathematics (Spreij)

Since 2000, the Stieltjes Institute organizes each year two or more instructional weeks on special topics (Stieltjes Onderwijsweken) aimed at advanced undergraduates and beginning graduate students. Doelman, jointly with P. Stevenhagen (UL) is coordinating these weeks. Three of those weeks were organized by members of the KdV Institute: Eigenvalue problems (Doelman), Capita Statistical Estimation Theory (Klaassen), Financial Mathematics (Spreij). In a fourth week (Riemann surfaces) some of the lectures were delivered by people from the KdV Institute.

2.12 Mathematical Preprint Series

Since a few years the preprints in the Mathematical Preprint Series of the KdV Institute appear only electronically. Authors are encouraged to post these preprints to the Mathematics arXiv (see <http://front.math.ucdavis.edu> for convenient browsing of this arXiv). It is the internationally best known and most comprehensive electronic preprint archive in mathematics. Moreover it has an excellent user interface. The KdV Institute is proud that its preprint series is an overlay for this arXiv starting January 2001. Some of the preprints in our preprint series also reside in the Beta Preprint Series and Publication Server of the UvA, in which the KdV Institute participates since October 1999.

In 2000 there appeared 33 papers in our preprint series; in 2001 there appeared 30 papers. See <http://www.science.uva.nl/research/math/preprintlist.html> for the full list and for downloading of individual preprints.

Chapter 3 - Mathematics and society

Together with the logician J. van Benthem, Dijkgraaf has given a series of seven public lectures at UvA called 'How mathematics works: from nature to cognition'. These lectures were meant for a general audience including students of all fields, in particular from the humanities. Around a series of 'everyday' topics (predictability, games, proof, symmetry, counting) a grand tour of present mathematics and logic was given. Additional support was provided by the Board of the UvA, by CMPA and by van Benthem's Spinoza premium. A book containing these lectures will appear in 2002 with Amsterdam University Press.

Dijkgraaf stepped into the 'public domain' on many other occasions. The following publications and activities can be mentioned:

NRC Handelsblad, 'Gevangen in een vliegend tapijt', Apr 22, 2000.

Open letter on Dutch physics highschool exams, various radio programs and newspapers, May 2000.

Lecture, 'Einsteins droom', Diligentia, Den Haag, Oct 2000.

Lecture, 'Snaren en zwaartekracht', Sterrenwacht Apeldoorn, Nov 2000.

Plenary Lecture, 'Snaartheorie', Woutschotenconferentie, Dutch Physics Teachers, Dec 2000.

Paradiso Lecture, 'Stringtheorie', Mar 2001.

Lecture, OKW Debat 'Future of the Exact Sciences', Trippenhuis, May 2001.

Lecture, 'Het heelal als vliegend tapijt', Natuurkundig Gezelschap Middelburg, Oct 2001.

Lecture, 'Het heelal als vliegend tapijt', Sterrenwacht, Oostzaan, Nov 2001.

Lecture, 'Einsteins droom en de wiskundige werkelijkheid', Natuurkundig Gezelschap Utrecht, Nov 2001.

Vara Television, On relativity and time travel, Nov 2001.

In 2000 Van der Waall was one of the five translators of the book by Dennis Guedj, 'Le théorème du perroquet' ('The theorem of the Perroquet, A story in the History of Mathematics') from French into Dutch. In 2001 Van der Waall and L. de Clerck published a booklet of 36 pages on conics for highschool students and teachers.

In February 2001 Koornwinder participated as a lecturer in the UvA Studium Generale on 'A cultural history of mathematics'. His lecture dealt with the second half of the 20th century.

IBIS considers publications in the popular scientific literature important. Consequently, the institute frequently submits papers to popular magazines. This year two contributions have appeared in STAtOR, the Dutch Magazine for Statistics and Operations Research, and one contribution has appeared in Chemisch Weekblad.

Balkema, Keane and Lenstra cooperated in a Dutch radio broadcasting in September 2001 in which Harry Willems organized two evenings of interviews within the radio weekly 'De Avonden'. The program dealt with the subject of the sealed letter of Wolfgang Doeblin in which he exposed his ideas on stochastic differential equations before committing suicide in the spring of 1941. This letter was only opened in 2000. A short paper on this topic by Spreij has appeared in the Nieuw Archief voor Wiskunde.

Spreij published, together with Frans Boshuizen (ING), a short paper on risk management in StatOR, a magazine of the Dutch Society for Statistics and Operations Research.

For many years the KdV Institute has sponsored the magazine for highschool students 'Pythagoras'. This included a contribution to the remuneration of the managing editor C. Zaal. The Institute also hired Gijswijt, one of its undergraduate students (now Ph.D. student), to do editorial work for Pythagoras.

The KdV Institute has organized several 'master courses' and 'master classes'. A master course is aimed at math teachers from secondary schools to provide them with up-to-date knowledge in their field, while attention is also paid to how to apply this knowledge in the classroom. Master classes are aimed at senior highschool pupils with a special interest in math. They normally last one or two days. In 2000 and 2001 a master course on 'Mathematics of sound' was given by Van der Craats, Doelman and P. Molenaar (Amstel Institute), while in 2001 a master course on 'Patterns and Waves' was given by Van der Craats and Doelman.

People from the KdV Institute are also involved with the yearly two-day summer courses at CWI and TU Eindhoven aimed at math teachers. Van de Craats is usually programming these courses and he edits the resulting Proceedings. In the 2001 course Doelman gave a lecture on 'Dimension, Theory and Experiment'.

Since a number of years, the UvA provides an extensive program in which secondary school pupils are given an thorough introduction into being a student at the university. In 2001 a class on geometry was given by Pijls as part of this program.

Van der Craats is very active in the field of the development of mathematics as it is being taught at high schools, and is a board member of many organizations that are active in this field. His affiliations include:

- Member of the board of the Stichting Vierkant voor Wiskunde.
- Member of the board of the Stichting Nederlandse Wiskunde Olympiade.
- Member of the board of the Stichting Wiskunde Kangoeroe.
- Member of the Nederlandse Onderwijs Commissie voor de Wiskunde.
- Advisory editor of Nieuw Archief voor Wiskunde.
- Advisory editor of Pythagoras.

Chapter 4 - Management

4.1 Finance

The financial situation of the KdV Institute is very uncertain. From 2000 onwards there have been yearly cutbacks in the basic funding from the Faculty of Science (FNWI). The cutback in lump sum funding is even more noticeable, when it is realized that from 2001 onwards the lump sum includes an amount of 84,7k euro for non-academic staff.

Increasingly, the institute has had to make substantial efforts to obtain outside funding, both from government research funds (NWO) and from commercial and industrial sources. In both respects, the institute has been very successful, with the result that the financial year 2000 shows a positive outcome. For the year 2001 the institute has also managed to stay clear from a financial loss, in spite of a 5% cutback in funding from the Faculty of Science which was announced as late as November 2001.

If the cutbacks in basic funding are not being restored, considerable deficits are to be expected for next few years and the still available financial reserves will be depleted to an alarmingly low level.

In k euro	2000	2001	
FNWI lump sum	1.261	1.233	
Other income	690	875	
Total		1.951	2.108
Personnel	1.555	1.867	
Other costs	199	238	
		1.754	2.105
NET RESULT		197	3

4.2 Human resources

As far as the academic staff is concerned, there is a very balanced and steady group of people working at the institute. Many researchers have been working here for many years, but the institute has also been successful in creating places for and attracting a new generation of young researchers, not only as Ph.D. students and post-docs, but also as full professors. In almost all of these cases outside (temporary) funding is immensely helpful and important.

Within the next few years, the employees with a purely educational workload, will gradually be leaving through early retirement schemes or full retirement. Their successors will have a task both in research and in teaching.

Apart from the people employed by the University, the institute welcomes a steady stream of visitors, who come to work here for shorter or longer periods of time.

It has proven to be more difficult to attract and keep qualified non-academic staff, which has made the work for the scientific director even more demanding. However, since early 2001, the secretarial support has improved considerably, while from late 2001 onwards, the position of (non-scientific) manager has been fulfilled, if only on a part-time basis.

For an overview of the people working at the institute see appendix 1.

As of 31 December 2001, the formation of the institute is as follows as calculated in fte (full time equivalent), including only those people who are employed by the University and excluding those who are paid directly by FOM or NWO (old contracts):

	1e geldstroom	2e geldstroom (NWO, KNAW, UvA)	3e geldstroom (AOT, IBIS)	
Full professor	6.2	1.4	0.8	8.4
Associate professor	5.8		0.3	6.1
Assistant professor	6.9	2.0		8.9
KNAW fellow		2.0		2.0
Post-doc		1.0		1.0
Ph. D. students	9.0	2.0	1.0	12.0
Non-academic staff	2.5			2.5
Total	30.4	8.4	2.1	40.9

In the table below the formation (including FOM and NWO employees) is translated into research input, distributed over the various research programs. On average, the research input is related to the human resources input in the following way: regular staff spend 50%, post-docs/fellows spend 90%, and Ph.D. students spend 75% of their time on research.

Research program	2000				2001			
	G-1	G-2	G-3	G-4	G-1	G-2	G-3	G-4
Dyn. Syst. & Num. Anal.	1.95	1.35			3.00	1.65		0.30
Stochastics	3.05	2.85	3.10		3.50	1.60	2.70	
Algebra & Geometry	2.65	1.65			3.00	3.80		0.15
Analysis	2.75	1.65			2.30	1.55		
Mathematical Physics	1.85	2.20		1.20	1.95	2.75		1.80
Discrete Mathematics	0.10				0.10	0.25		
Total	12.35	9.70	3.10	1.20	13.85	11.60	2.70	2.25

4.3 Facilities

4.3.1 Housing

The institute has a chronic shortage of housing facilities. Most researchers, except for the full professors and some of the more senior associate professors, have to share their (already small) rooms with another member of the institute. Most rooms are located on one floor, allowing for

easy access for people who work in the same programs and projects, but a handful of rooms are located on different floors. As a rule, the institute also tries to offer a desk to the visitors who come to stay for a more prolonged stay, using the offices of those employees who themselves are away for a shorter or longer visit abroad.

4.3.2 Computers

Mathematicians are rather modest when it comes to their need for tools and equipment. Of course, the availability of a computer, with some dedicated software, on the desk of each researcher is a necessary condition. Depending on the personal taste and need, this computer can be a SUN workstation, a Windows PC or a Linux PC. The institute, with the technical support of the IT-department, uses its limited budget to maintain a carefully defined number of work stations and computers, where machines are renewed and moved on with consideration to each person's special needs and wishes.

4.3.3 Library

The mathematics library of the University of Amsterdam is located at the Euclides Building, the same building where the KdV Institute itself is housed. The library is part of the library of the Faculty of Science. The library of the Faculty is managed by the Head of Scientific Information Services, who is appointed by the Dean of the Faculty.

Of course, the mathematics library is of vital importance for the research and education activities of the KdV Institute. Landsman represents the institute in the library council of the Faculty of Science. Landsman's membership of this council also involves preparing decisions about journal subscriptions and book purchases within the (very tight) available budget; he does so in consultation with F. Kroon, who is the 'vakreferent' for mathematics appointed by the faculty and who, until a few years ago, was the mathematics librarian.

As far as journals are concerned, the increasing digitalization of scientific publishing (as well as of society in general) implies that subscriptions to math journals are gradually being changed from a printed version delivered by mail to an electronic version immediately accessible through the internet. This trend is fully supported by the Central University Library, which has made the digitalization of the information it offers as one of its main priorities. This development has huge advantages for users who can download and print papers from their office. Simultaneously, the enormous price increases of scientific journals in the recent past tend to be absorbed by long-term license agreements between publishers and universities, which typically guarantee digital access to a large number of journals for, say, five years, for a fixed price.

Concerning books, an important change of policy for purchasing books took place in 2000. Almost all standing orders to book series were canceled, so that the money thus saved could be spent on books of immediate interest to researchers at the KdV Institute, supplemented by a small number of books of general interest. Moreover, project leaders of some of the larger research projects in the institute who have financial support from outside, have contributed money in order to buy books for the library in the fields of their projects. Thus, some of the gaps in the book collection could be filled. Unfortunately, the money saved by the cancellation of standing orders was later completely removed by the manager in charge from the budget for math books. This is still disputed by the KdV Institute. Altogether, the budget for books has

decreased by more than 50% over the last three years. Consequently, it is no longer possible to maintain a decent and up-to-date collection of mathematics books. Buying is now limited to the two categories mentioned above. Roughly speaking, the KdV Institute can only purchase about 1% of the books necessary to maintain the intrinsic quality of the collection. It should be mentioned that the mathematics library of the UvA was founded by L.E.J. Brouwer, one of the greatest mathematicians of the 20th century, and that it used to be unparalleled in The Netherlands.

4.3.4 Webpages

The homepage <http://www.science.uva.nl/research/math/> of the KdV Institute gives access to a large number of webpages concerning aspects of the institute, its research and teaching. We try to keep these pages informative and up-to-date, with emphasis on content rather than frills, and with easy and quick, browser and platform independent accessibility. Many pages have a link to a html checker for that page.

Webmasters are Nuyens and Koornwinder, while E. Wallet also maintains some of the pages.

Appendices

1. People in research programs

(includes all researchers, independent of source of funding; the month mentioned after ‘until’ refers to the first month not at the institute)

Algebra and Geometry

Program leader

prof. dr. G.B.M. van der Geer

Projects

Algebraic Geometry

Project leaders

prof. dr. G.B.M. van der Geer

Members

dr. B.J.J. Moonen (from 07-2001)

prof. dr. E. Izadi (from 09-2001)

drs. R.S. de Jong (from 01-2001)

drs. S. Kronemeijer

drs. R. Salomon (from 09-2001)

drs. N. Krämer (from 11-2001)

drs. R.S.G.R. Re

drs. G.M. Farkas (until 09-2000)

drs. V. Shabat (until 09-2000)

Algebraic Groups

prof. dr. E.M. Opdam

dr. M.F.E. de Jeu (from 08-2000)

dr. P. Moree (from 07-2000)

dr. J.V. Stokman (from 02-2000)

drs. K. Slooten

drs. E. Emsiz (from 07-2001)

(Finite) Group Theory

dr. R.W. van der Waall

Analysis

Program leader

prof. dr. T.H. Koornwinder

Projects

Lie theory and special functions

Project leaders

prof. dr. T.H. Koornwinder

Members

dr. E. Hendriksen

drs. N. Touhami (from 07-2000)

dr. R. Vidunas (until 11-2001)

Complex analysis

dr. J.J.O.O. Wiegerinck

dr. P.J. de Paepe

prof. dr. J. Korevaar

drs. P.J. Beneker

drs. F.A.M.O. Lemmers (until 09-2001)

Mathematical Physics

Program leader

prof. dr. R.H. Dijkgraaf

Projects

String Theory (jointly with ITFA)

Project leaders

prof. dr. R.H. Dijkgraaf

Members

drs. D.B. Grünberg

drs. S. Kronemeijer

drs. L. Tomassini

dr. M. Serone (until 09-2000)

(p.m.: ten further member of the

group at ITFA and at the Spinoza Institute Utrecht)

Quantization and Operator Algebras

prof. dr. N.P. Landsman

dr. M. Müger (from 07-2001)

drs. H.B. Posthuma

dr. B. Kuckert (from 10-2000)

Geometric Algebra (jointly with IAS-group)

dr. H.G.J. Pijls

dr. L. Dorst (IAS-group)

drs. T.A. Bouma

prof. dr. E.M. de Jager

Discrete Mathematics

Program leader

prof. dr. A. Schrijver

Member

drs. D.C. Gijswijt (from 09-2001)

drs. C. de Vreugd

Dynamical Systems and Numerical Analysis

Program leader

prof. dr. A. Doelman

Projects

Applied Analysis and Dynamical Systems

Project leaders

prof. dr. A. Doelman

Members

dr. A.J. Homburg (from 08-2000)

dr. R.G. de Vilder

dr. G. Hek (from 11-2000)

dr. D. Iron (from 09-2001)

ir. H. van der Ploeg

drs. G.M. Terra (from 05-2000)

drs. Nguyen Huu Khanh (from 02-2001)

drs. N.J.M. Valkhoff (from 09-2001)

prof. dr. S.J. van Strien

Numerical Analysis

dr. W. Hoffmann

prof. dr. P.W. Hemker

prof. dr. J.G. Verwer (from 12-2000)

dr. P.R. Pfluger

ir. M.H. van Raalte (from 12-2000)

prof. dr. P.J. van der Houwen (until 09-2000)

Stochastics

Program leader

prof. dr. C.A.J. Klaassen

Projects

Mathematical Statistics

Project leaders

prof. dr. C.A.J. Klaassen

Members

dr. A.J. van Es

dr. A.J. Lenstra

drs. Ph. J. Mokveld

drs. H.W. Uh

drs. E.V. Bogouslavskaja

drs. E. Edens

drs. R.A. Ion (until 06-2001)

Industrial Statistics (IBIS) Probability Theory

prof. dr. R.J.M.M. Does

dr. A.A. Balkema

prof. dr. S. Bisgaard (from 01-2001)

prof. dr. M. Keane

prof. dr. C.A.J. Klaassen

dr. P.J.C. Spreij

dr. A. Trip

drs. R. Peters

drs. J. de Mast

drs. M.F.M. Nuyens

drs. W.N. van Wieringen

drs. J.H. van Zanten (until 09-2001)

drs. R.A. Ion (until 06-2001)

drs. J.E. Wieringa (until 01-2001)

dr. E.R. van den Heuvel (until 12-2001)

Didactics (jointly with Amstel Institute and ILO)

Members

prof. dr. J. van de Craats

dr. A.L. Ellermeijer (Amstel Institute)

drs. A.J.P. Heck (Amstel Institute)

dr. R. Dekker (ILO)

drs. M.H.J. Pijls (ILO)

Teaching

dr. J.M. Geijsel (until 07-2001)

drs. E.W.M. Koper

2. Editorships and affiliations

A.A. Balkema

Member of the organizing committee for the 20th Seminar on Stability Problems in Stochastics, Eger, Hungary 2001.

J. van de Craats

Member of the board of the Akademie Raad voor de Wiskunde of the KNAW.
(see also Van der Craats' memberships listed in Chapter 3)

R. Dekker

Member of the International Commission for the Study and Improvement of Mathematics Teaching (CIEAEM).

Member of the International Program Committee and President of the Organizing Committee of CIEAEM 52, Restricted Meeting. Amsterdam, 2000.

Member of the Local Organizing Committee of the Program Committee of the Twenty-fifth Conference of the International Group for the Psychology of Mathematics Education (PME 25). Utrecht, 2001.

A. Doelman

Editor *Physica D*.

Member of committee 'Mathematics and the Ocean' (Math Forum, Mathematics Awareness Month 2001)

Organizer symposium 'Nonlinear Systems', Enschede, 2000.

R.J.M.M. Does

Editor *Quantitative Methods*.

Member of the Editorial Board, *Quality Engineering*.

Treasurer, European Network for Business and Industrial Statistics.

Member of the ISI Committee on Statistics in Business and Industry.

Organizer of the Founding Conference of the European Network for Business and Industrial Statistics in Amsterdam.

Organizer of the ISI Session on Contemporary Methods in Quality Management in Seoul, Korea.

R.H. Dijkgraaf

Editor *Communications in Mathematical Physics*, Managing Editor of section String theory, conformal field theory.

Editor *Nuclear Physics B*, Supervisory.

Editor *Journal of Geometry and Physics*.

Editor *Advances in Theoretical and Mathematical Physics*.

Editor *International Mathematical Research Notices*.

Editor *Journal of Mathematical Physics*.

Editor *Reviews of Mathematical Physics*.

Editor *Academische Boekengids*, Amsterdam University Press.

Member editorial board of several book series (Elsevier Mathematical Library, Springer).

Member Advisory Committee International Workshops on Algebraic Geometry and Physics.

Member, Scientific Steering Committee, Isaac Newton Institute for Mathematical Sciences, Cambridge University.

Member, Scientific Steering Committee, Max-Planck-Institut für Mathematik, Bonn.

Member, Scientific Steering Committee, Lorentz Center, Leiden University.

Chair, Program Committee Mathematical Physics, International Congress of Mathematics, Beijing, 1999-2000.

External Assessor, Chair of Natural Philosophy, Trinity College Dublin, 2000.

Member, International Advisory Committee, Strings 2001, Tata Institute, Mumbai.

Chair, Program Management, FOM-GBE Program Mathematical Physics.

Program Manager, FOM Program String Theory and Quantum Gravity.

G. van der Geer

Managing editor *Compositio Mathematica*.

Editor *Geometriae Dedicata*.

Editor of monograph series of the European Mathematical Society

Mitglied des Wissenschaftlichen Beirats Research Institute Oberwolfach.

Member Scientific Committee Max-Planck Institut für Mathematik, Bonn.

P.W. Hemker

Editor ‘Computational Methods in Applied Mathematics’.

Vice-chair IFIP Working Group 2.5 on Numerical Software.

Member NWO Programmacommissie Computational Science.

Member Numerical Algorithms Group, NAG Inc.

Elected as CWI Fellow, Centrum voor Wiskunde en Informatica, Amsterdam.

E.M. de Jager

Advisory Editor ‘Mathematical Methods in the Applied Sciences’.

Board member of ‘Bernoulli Stichting’ in Groningen.

M.S. Keane

Associate Editor, Dynamics and Stability of Systems.

Associate Editor, Probability Theory and Mathematical Statistics.

Associate Editor, CWI Tracts.

Coordinating editor, *Indagationes Mathematicae*.

Member of the governing board and secretary for *Compositio Mathematica*.

Advisor of the 3rd UK-Japan Winter School, Bury St Edmunds, UK, 2001.

Chairman of the Committee of Conferences on Stochastic Processes.

Co-organizer, Workshop Dynamical Systems and Related Fields, Budapest, Hungary, 2001.

Organizer, *Bijeenkomst Stochastici*, Lunteren.

Member of board, Akademieraad voor de Wiskunde.

Member KNAW.

Foreign member, Chilean Academy of Sciences.

Elected as Sackler Fellow, Institute for Advanced Studies, Tel Aviv.

Member, Scientific Council Eurandom.

C.A.J. Klaassen

Chairman of the Publications Committee of the International Statistical Institute (ISI).
Member of the Scientific Advisory Committee of the Netherlands Forensic Institute (NFI).
Member of the Steering Committee for Statistical Inference for Complex Statistical Models of Eurandom.

T.H. Koornwinder

Member of a visiting committee for evaluating research at the Department of Mathematics, University of Vienna, October 2000.
Member of Selection Committee Mathematics, NWO, until December 2000.
Deputy of UvA in the VSNU chamber on mathematics.
Member of the board of the Thomas Stieltjes Institute.
Chair of the Science Committee of the Thomas Stieltjes Institute.
Member of the International Organizing Committee of the NATO Advanced Study Institute. Special Functions 2000: Current Perspective and Future Directions Tempe, Arizona, USA.

J. Korevaar

Member KNAW.
Honorary member of Wiskundig Genootschap (Dutch Mathematical Society).
Honorary member of American Mathematical Society.

N.P. Landsman

Board Member FOM/GBE ‘Samenwerkingsverband Mathematische Fysica’.
Member International Advisory Committee Bialowieza Workshops on Geometric Methods in Physics.
Member Library Committee of the University of Amsterdam.

E.M. Opdam

Member of the Selection Committee Mathematics, NWO, as of January 2001.

A. Schrijver

Editor-in-chief *Combinatorica*.
Editor *Discrete Applied Mathematics*.
Editor *Journal of Combinatorial Optimization*.
Editor *Journal of Combinatorial Theory, Series B*.
Editor *Journal of Combinatorics, Information and System Sciences*.
Editor *Mathematics of Operations Research*.
Editor *SIAM Journal on Discrete Mathematics*.
Advisory editor North-Holland Mathematical Library.
Member editorial board *SIAM Monographs on Discrete Mathematics and Applications*.
Member board EIDMA -- Euler Institute for Discrete Mathematics and Its Applications.
Member KNAW.
Member Akademie Raad voor de Wiskunde.
Member Symposium Advisory Committee Mathematical Programming Society.
Member Program Committee Networks NWO.
Member Advisory Board Mathematics, TU Eindhoven.

P.J.C. Spreij

Member of the Steering Committee Séminaire de Statistique Européen.

Member of the board of the Mathematical Section of the VVS (Dutch Society for Statistics and Operation Research).

Member of the Steering Committee Financial Stochastics at Eurandom.

Organizer of the DYNSTOCH workshop, Padova, 2000.

Organizer of the workshop on Hellinger processes, Helsinki, 2001.

Organizer of the Winter School on Financial Mathematics, Oegstgeest, 2001.

J.G. Verwer

Senior Editor of APNUM (Applied Numerical Mathematics).

3. ‘Tweede geldstroom’ projects

NWO

C.A.J. Klaassen (NWO/GBE/math): project ‘Nonparametric statistical process control’; Ph.D. student position for R.A. Ion (07-1997 until 07-2001).

A.J. van Es/C.A.J. Klaassen (NWO/GBE/math): project ‘Nonparametric deconvolution and related inverse problems’; Ph.D. student position for H.W. Uh (05-1998 until 05-2002).

T.H. Koornwinder (NWO/GBE/math): project jointly with N.M. Temme (CWI) ‘Algorithmic methods for special functions by computer algebra’; post-doc position R. Vidunas (11-1999 until 11-2001).

A. Doelman (NWO/GBE/math): project ‘Pattern formation in reaction-diffusion equations’; Ph.D. student position for H. van der Ploeg, (12-1999 until 12-2003).

E.M. Opdam (NWO/GBE): Pionier (07-2000 until 07-2005).

G. van der Geer, R.H. Dijkgraaf and T.H. Koornwinder (NWO/GBE): for scientific activities in connection with visits by prof. dr. V. Schechtman (09-2001 until 12-2002).

A. Schrijver (NWO/GBE/math): project ‘Spectral methods for graph optimization and embedding’; Ph.D. student position for D.C. Gijswijt (04-2001 until 04-2005).

N.P. Landsman (NWO/GBE/math): project jointly with I. Moerdijk (UU) ‘Braided categories, operator algebras, and quantum groupoids’; post-doc position for H.A.H. Müger (07-2001 until 07-2003).

A. Doelman (NWO Priority Program ‘Non-Linear Systems’): first year of UD position of A.J. Homburg (08-2000 until 08-2001).

FOM

R.H. Dijkgraaf and G. van der Geer (FOM/Mathematical Physics): project ‘Mirror symmetry: algebraic, geometric and arithmetic aspects’; Ph.D. student position for S. Kronemeijer (11-2000 until 11-2004).

N.P. Landsman (FOM/Math. Phys.): project ‘Spin-statistics connection and Unruh effect in quantum field theory’; 2-year post-doc position for B. Kuckert (10-2000 until 10-2002). (He left at the end of 2001 to take up a prestigious Emmy Noether fellowship in his home country Germany.)

A. Doelman (FOM): project jointly with L. Maas (NIOZ, Texel), ‘Secondary tides and quasi-periodically forced nonlinear oscillators’; Ph.D. student position for G. M. Terra (05-2000 until 05-2004).

N. P. Landsman/R.H. Dijkgraaf (FOM/Math. Phys.): project ‘Quantized gauge fields and non-commutative geometry’; Ph.D. student position for H.B. Posthuma (08-1998 until 04-2003).

KNAW

E. M. Opdam/J.V. Stokman: KNAW fellowship for J.V. Stokman (02-2000 until 02-2003).

R. H. Dijkgraaf/N.P. Landsman: KNAW fellowship for N.P. Landsman (07- 2000 until 07-2002).

G.B.M van der Geer/B.J.J. Moonen: KNAW fellowship for B.J.J. Moonen (07-2001 until 07-2003).

N.P. Landsman/B. Kuckert (Casimir-Ziegler research prize, a joint prize of the Nordrhein-Westfalische Akademie der Wissenschaften and the KNAW in order to advance the exchange of researchers): post-doc position for B. Kuckert (10-1999 until 10-2000).

UvA

J. van de Craats and T. Ellermeijer (Amstel Institute): Ph.D. student project for A Heck, from the multidisciplinary Ph.D. project pool of former Faculty WINS.

H.G. Pijls and L. Dorst (IAS-group): project ‘From Clifford Algebra to Geometric Algorithms’, Ph.D. student project for T.A. Bouma, from the multidisciplinary Ph.D. project pool of former Faculty WINS (02-2000 until 02-2003).

A. Doelman/G. Hek (UvA-Emancipatiefonds, program that encourages the appointment of female academic staff): partial three-year support of part-time post-doc position of G. Hek (11-2000 until 11-2003)

P. de Paepe (‘Duaal leren’, Ministry of Education/UvA): fl 130.000,- (1999 until 2001).

R.H. Dijkgraaf: 1 million guilders during 5 years for special mathematical physics activities of the Center of Mathematical Physics Amsterdam (CMPA) (1998-2002).

4. ‘Derde geldstroom’ projects

IBIS

The research work in industrial statistics is coordinated by the Institute for Business and Industrial Statistics (IBIS UvA BV), which is embedded in the UvA Holding. This institute combines scientific research with consultancy activities. For further details, see 2.6.2. One third of the yearly profits goes to the research fund for Industrial Statistics of the KdV Institute.

Financial Mathematics Amsterdam

The FWA is a joint commercial initiative of UvA, VU and CWI of which Spreij is the interim director. In the year 2000 FWA organized a course on Advanced Financial Engineering that was attended by some 25 participants from the financial industry. FWA also organized a special lecture by Paul Wilmott on Modern Quantitative Financial Modeling in the Renaissance Hotel in Amsterdam (June 5, 2000).

European Projects

- Spreij is scientist in charge of the Amsterdam team of the EU training research network DYNSTOCH.
- Spreij is a member of the EU training research network ERNSI.
- The INTAS project Georgia-97-1828 concerns itself with estimation of parameters and construction of goodness-to-fit tests in some non- and semi-parametric models. The project runs from 1 March 1999 to 1 March 2002. Cooperation between the UvA, Razmadze Mathematical Institute of the Georgian Academy of Sciences and Limburgs Universitair Centrum, Diepenbeek, Belgium. The scientific coordinator of the project is prof. dr. C. A. J. Klaassen of the KdV Institute.

AOT; IMG Holland NV

The work on financial mathematics has obtained financial support from IMG Holland NV until June 2001 and by AOT NV from then on. De Vilder has initiated discussions with AOT NV for further collaboration between this company and the KdV Institute. For further details, see 2.7.1.

Philips Research Laboratories

Keane has been advisor for Philips Research Laboratories, Eindhoven, for many years. In November 2001 this was formalized in a contract between Philips and the KdV Institute.

Paid Editorships

Van der Geer as managing editor of *Compositio Mathematica*. For further details see 2.9
Dijkgraaf as supervisory editor of *Nuclear Physics B*.
Doelman as editor of *Physica D*.

5. List of publications 2000-2001

Scientific publications: articles in journals, proceedings and edited books; monographs. These are always refereed.

Preprints and reports: included in an existing preprint/report series (electronically or in hardcopy).

Other publications: book editor or professional or popularizing publication.

Author names in bold have or had an affiliation with the KdV Institute while research for the publication was done or while the publication appeared.

MR: Mathematical Reviews; **CMP:** Current Mathematical publications. Documentation and review for the paper corresponding to a given MR or CMP number can be electronically obtained from MathSciNet at <http://www.ams.org/mathscinet> (not a free service).

arXiv:math: the Mathematics ArXiv, for which a front is provided at <http://front.math.ucdavis.edu>.

arXiv:hep-th: High Energy Physics – Theory, see <http://arxiv.org/archive/hep-th>

KdV Math. Preprint Series: see <http://www.science.uva.nl/research/math/preprintlist.html>

Algebra and Geometry

Scientific publications

C. Ciliberto and **G. van der Geer**, *Moduli of abelian varieties and the singularities of the theta divisor*, in: *Surveys of differential geometry VII*, International Press, 2001, pp. 61-81.

G. Farkas, *The geometry of the moduli space of curves of genus 23*, *Math. Ann.* 318 (2000), 43-65; MR 2001f:14048.

G. Farkas, *Brill-Noether loci and the gonality stratification of M_g* , *J. Reine Angew. Math.* 539 (2001), 185-200; CMP 1 863 860; arXiv:math.AG/0007024.

G. van der Geer, *Error-correcting codes and curves over finite fields*, in: *Mathematics unlimited --- 2001 and beyond*, B. Engquist and W. Schmid (eds.), Springer, 2001, pp. 1115-1138; CMP 1 852 207.

G. van der Geer, *Curves over finite fields and codes*, in: *European Congress of Mathematics (Barcelona, 2000)*, Vol. II, C. Casacuberta et al. (eds.), Progr. Math. 202, Birkhäuser, 2001, pp. 225-238.

G. van der Geer, *Coding theory and algebraic curves over finite fields*, in: *Applications of algebraic geometry to coding theory, physics and computation*, C. Ciliberto et al. (eds.), Kluwer, 2001, pp. 139-159.

G. van der Geer and T. Katsura, *On a stratification of the moduli of $K3$ surfaces*, *J. Eur. Math. Soc. (JEMS)* 2 (2000), 259-290; MR 2001g:14063.

G. van der Geer and T. Katsura, *Formal Brauer groups and moduli of abelian surfaces*, in: *Moduli of abelian varieties (Texel Island, 1999)*, Progr. Math. 195, Birkhäuser, 2001, pp. 185-202; CMP 1 827 020.

G. van der Geer and R. Schoof, *Effectivity of Arakelov divisors and the theta divisor of a number field*, *Selecta Math. (N.S.)* 6 (2000), 377-398; CMP 1 847 381.

G. van der Geer and M. van der Vlugt, *Kummer covers with many points*, *Finite Fields Appl.* 6 (2000), 327-341; MR 2001g:11097.

G. van der Geer and M. van der Vlugt, *Tables of curves with many points*, *Math. Comp.* 69 (2000), 797-810; MR 2000i:11097.

E. Koelink and **J.V. Stokman**, *The Askey-Wilson function transform*, *Internat. Math. Res. Notices* (2001), no. 22, 1203-1227; CMP 1 862 616.

E. Koelink and **J.V. Stokman**, *The Askey-Wilson function transform scheme*, in: *Special functions 2000: perspective and future directions*, J. Bustoz, M. Ismail and S. Suslov (eds.), NATO Science Series II, Vol. 30, Kluwer, 2001, pp. 221-241; arXiv:math.CA/9912140.

E. Koelink and **J.V. Stokman**, with appendix of M. Rahman, *Fourier transforms on the quantum $SU(1,1)$ group*, *Publ. Res. Inst. Math. Sci.* 37 (2001), 621-715; CMP 1 865 407.

- H.W. Lenstra, Jr. and **P. Stevenhagen**, *Artin reciprocity and Mersenne primes*, Nieuw Arch. Wiskd. (5) 1 (2000), 44-54; MR 2001h:11006
- B. Moonen**, *Group schemes with additional structures and Weyl group cosets*, in: *Moduli of abelian varieties (Texel Island, 1999)*, Progr. Math. 195, Birkhäuser, 2001, pp. 225-298; MR 2002c:14074.
- P. Moree** and **P. Stevenhagen**, *A two-variable Artin conjecture*, J. Number Theory 85 (2000), 291-304; CMP 1 802 718.
- P. Moree** and **P. Stevenhagen**, *Prime divisors of the Lagarias sequence*, in: *21st Journées Arithmétiques (Rome, 2001)*, J. Théor. Nombres Bordeaux 13 (2001), 241-251; MR 2002c:11016
- E.M. Opdam**, *Lecture notes on Dunkl operators for real and complex reflection groups*, MSJ Memoirs, Vol. 8, Mathematical Society of Japan, 2000; CMP 1 805 058; arXiv:math.RT/9812007 and arXiv:math.RT/9808026.
- E.M. Opdam**, *Multivariable hypergeometric functions*, in: *European Congress of Mathematics (Barcelona, 2000)*, Vol. I, C. Casacuberta et al. (eds.), Progr. Math. 201, Birkhäuser, 2001, pp. 491-508.
- R. Re**, *The rank of the Cartier operator and linear systems on curves*, J. Algebra 236 (2001), 80-92; MR 2002c:14016.
- H. Roskam**, *A quadratic analogue of Artin's conjecture on primitive roots*, J. Number Theory 81 (2000), 93-109; MR 2000k:11128.
- J.V. Stokman**, *Koornwinder polynomials and affine Hecke algebras*, Internat. Math. Res. Notices (2000) no. 19, 1005-1042; MR 2001m:20006; arXiv:math.QA/0002090.
- J.V. Stokman**, *On BC type basic hypergeometric orthogonal polynomials*, Trans. Amer. Math. Soc. 352 (2000), 1527-1579; MR 2001j:33015.
- J.V. Stokman**, *Multivariable orthogonal polynomials and quantum Grassmannians* (Ph.D. Thesis, Universiteit van Amsterdam, 1998), CWI Tract 132, Stichting Mathematisch Centrum, Centrum voor Wiskunde en Informatica, Amsterdam, 2001; CMP 1 868 137.
- V. Talamanca**, *A Gelfand-Beurling type formula for heights on endomorphism rings*, J. Number Theory 83 (2000), 91-105; MR 2001i:11081.
- R.W. van der Waall**, *On iterated group actions and direct products*, J. Algebra 223 (2000), 57-65; MR 2000m:20041.

Preprints and Reports

- A. Besser and **P. Moree**, *On an invariant related to a linear inequality*, arXiv:math.LA/0104149, 2001.
- C.F. Dunkl and **E.M. Opdam**, *Dunkl operators for complex reflection groups*, arXiv:math.RT/0108185, 2001.
- T. Ekedahl and **G. van der Geer**, *The top Chern class of the Hodge bundle on the moduli space of abelian varieties*, arXiv:math.AG/0009104, 2000.
- J.-H. Evertse, **P. Moree**, C. L. Stewart and R. Tijdeman, *Multivariate Diophantine equations with many solutions*, arXiv:math.NT/0107219, 2001.
- G. van der Geer** and M. van der Vlugt, *An asymptotically good tower of curves of the field with eight elements*, arXiv:math.AG/0102158, 2001.
- G. van der Geer** and M. van der Vlugt, *The coset weight distributions of certain BCH codes and a family of curves*, arXiv:math.AG/0106089, 2001.
- M. de Jeu**, *Subspaces with equal closure*, arXiv:math.CA/0111015, 2001.
- M. de Jeu**, *Determinate multidimensional measures, the extended Carleman theorem and quasi-analytic weights*, arXiv:math.CA/0111019, 2001. Accepted by Ann. Probab.
- P. Moree**, *Artin's primitive root conjecture - a survey*, in: *Summer school on the Riemann zeta function and random matrix theory (Oberwolfach, October 15-21, 2000)*, Course materials, 2000, <http://www.math.tau.ac.il/~rudnick/dmv.html>.
- P. Moree**, *Asymptotically exact heuristics for (near) primitive roots. II*, arXiv:math.NT/0104148, 2001.
- P. Moree**, *Chebyshev's bias for composite numbers with restricted prime divisors*. arXiv:math.NT/0112100, 2001.
- M. Noumi and **J.V. Stokman**, *Askey-Wilson polynomials: an affine Hecke algebraic approach*, arXiv:math.QA/0001033, 2000.
- E.M. Opdam**, *On the spectral decomposition of affine Hecke algebras*, KdV Math. Preprint Series 00-22, arXiv:math.RT/0101007, 2000.
- E.M. Opdam**, *A generating function for the trace of the Iwahori-Hecke algebra*, arXiv:math.RT/0101006, 2001.
- J.V. Stokman**, *An expansion formula for the Askey-Wilson function*, arXiv:math.CA/0105093, 2001; accepted by J. Approx. Theory.
- J.V. Stokman**, *Difference Fourier transforms for nonreduced root systems*, arXiv:math.QA/0111221, 2001.

Other publications

C. Faber, **G. van der Geer** and F. Oort (eds.). *Moduli of abelian varieties (Texel Island, 1999)*, Progr. Math. 195, Birkhäuser, 2001; MR 2001j:14002.

J. Moree, **P. Moree** and L. Roobol, *Wiskundige voorouders*, Nieuw Arch. Wiskd. (5) 2 (2001), 146-147; CMP 1 834 539.

Ph.D. Theses

G. Farkas, *The birational geometry of the moduli space of curves*, Ph.D. Thesis, Universiteit van Amsterdam, June 26, 2000; promotor: **prof. dr. G. van der Geer**.

A. Gee, *Class fields by Shimura reciprocity*, Ph.D. Thesis, Universiteit van Amsterdam, January 11, 2001; promotor: **prof. dr. P. Stevenhagen**.

V. Shabat, *Curves with many points*, Ph.D. Thesis, Universiteit van Amsterdam, February 21, 2001; promotor: **prof. dr. G. van der Geer**.

Analysis

Scientific publications

P. Beneker and **J. Wiegerinck**, *Exposedness in Hardy spaces of domains of finite connectivity*, Indag. Mathem. (N.S.) 11 (2000), 487-497.

A. Bultheel, P. González-Vera, **E. Hendriksen** and O. Njåstad, *Elements of a theory of orthogonal rational functions*, Rev. Acad. Canaria Cienc. 11 (1999), 127-152; MR 2001i:4204. (*This 1999 paper was not yet included in our annual report of 1999.*)

A. Bultheel, P. González-Vera, **E. Hendriksen** and O. Njåstad, *Monotonicity of multi-point Padé approximants*, Commun. Anal. Theory Contin. Fract. 8 (2000), 14-27; MR 2001k:41015.

A. Bultheel, P. González-Vera, **E. Hendriksen** and O. Njåstad, *Interpolation by rational functions with nodes on the unit circle*, Acta Appl. Math. 61 (2000), 101-118; MR 2001h:41021.

A. Bultheel, P. González-Vera, **E. Hendriksen** and O. Njåstad, *Orthogonal rational functions and interpolatory product rules on the unit circle. III. Convergence of general sequences*, Analysis (Munich) 20 (2000), 99-120; MR 2001h:30032.

A. Bultheel, P. González-Vera, **E. Hendriksen** and O. Njåstad, *Determinacy of a rational moment problem*, J. Comput. Appl. Math. 133 (2001), 241-252; CMP 1 858 253.

A. Bultheel, P. González-Vera, **E. Hendriksen** and O. Njåstad, *Quadrature and orthogonal rational functions*, in: *Numerical analysis 2000, Vol. V, Quadrature and orthogonal polynomials*, J. Comput. Appl. Math. 127 (2001), 67-91; MR 2001m:65036.

A. Bultheel, P. González-Vera, **E. Hendriksen** and O. Njåstad, *Orthogonal rational functions and continued fractions*, in: *Special functions 2000: perspective and future directions*, J. Bustoz, M. Ismail and S. Suslov (eds.), NATO Science Series II, Vol. 30, Kluwer, 2001, pp. 87-109.

G. Carnovale and **T.H. Koornwinder**, *A q-analogue of convolution on the line*, Methods Appl. Anal. 7 (2000), 705-726; CMP 1 868 553; arXiv:math.CA/9909025.

A. Heinis and **J. Wiegerinck**, *Extreme and exposed representing measures of the disk algebra*, Ann. Polon. Math. 73 (2000), 105-118; MR 2001g:46116.

E. Hendriksen and C. Nijhuis, *Laurent-Jacobi matrices and the strong Hamburger moment problem*, Acta Appl. Math. 61 (2000), 119-132; CMP 1 783 287.

T.H. Koornwinder, *Some details of proofs of theorems related to the quantum dynamical Yang-Baxter equation*, Int. J. Math. Math. Sci. 24 (2000), 793-806; MR 2002b:17013; arXiv:math.QA/0007079.

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List of abbreviations

CMPA	Centre for Mathematical Physics Amsterdam (UvA)
CWI	Centrum voor Wiskunde en Informatica – Center for Mathematics and Information Science (Amsterdam)
Eurandom	European Institute for the Study of Randomness (Eindhoven)
IAS-group	group Intelligent Autonomous Systems within the Informatics Institute, faculty of Science, UvA
IBIS	Instituut voor Bedrijfs- en Industriële Statistiek
ILO	Instituut voor de Lerarenopleiding, UvA
ITFA	Instituut voor Theoretische Fysica Amsterdam – Institute for Theoretical Physics, University of Amsterdam
KNAW	Koninklijke Nederlandse Akademie voor Wetenschappen – Royal Netherlands Academy of Sciences
UL	University of Leiden
UU	University of Utrecht