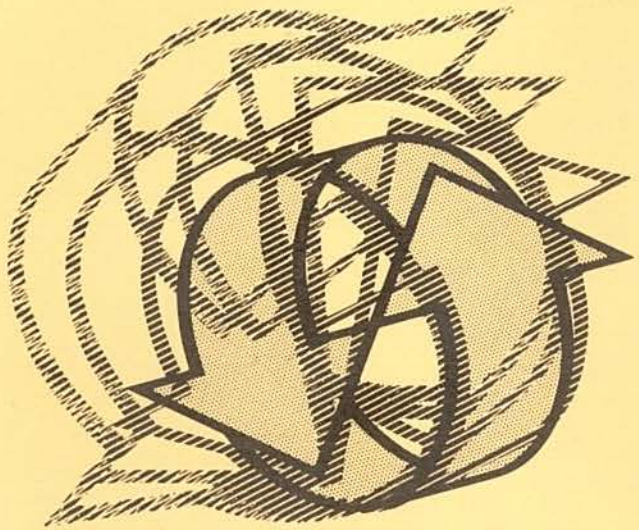
Centrum voor Wiskunde en Informatica
Centre for Mathematics and Computer Science

Scientific Publications

1987



CWI Scientific Publications

Contents

Centre for Mathematics and Computer Science (CWI)
P.O. Box 4079, 1009 AB Amsterdam, The Netherlands
Telephone 31 - 20 592 9333, telex 12571 (mactr nl)

Introduction

CWI is the research institute of the Stichting Mathematisch Centrum, which was founded on February 11, 1946, as a nonprofit institution aiming at the promotion of mathematics, computer science, and their applications. It is sponsored by the Dutch Government through the Netherlands Organization for the Advancement of Pure Research (ZWO). At present about 100 researchers are employed at CWI.
CWI publishes, apart from the scientific reports, three series of publications through its own publication department: the Monographs, the Tracts and the Syllabi.

CWI Monographs is a hard cover series, which started in 1984. It contains monographs on a high level, as well as proceedings of symposia and lecture notes on a single, coherent subject. They are written or edited by (ex-)researchers of CWI. The series is published and distributed in cooperation with North-Holland Publishing Company.
CWI Tracts mainly contain theses and other scientific research, both by CWI staff members and by others. Proceedings of conferences organized by CWI are also published in this series.
CWI Syllabi mainly contain reports of seminars, manuals to courses organized by CWI and revisions of lecture notes.

This booklet contains information on the titles published in these three series, as well as on some other publications. On the back cover you will find ordering information and an order form.
Further information can be obtained from our publication department: C.E. Thomson, telephone 31 - 20 592 4010.

Orders for CWI Monographs should be mailed to your supplier/bookseller, or to Elsevier Science Publishers, Book Order Department, P.O. Box 211, 1000 AE Amsterdam, The Netherlands. All other orders to be adressed to CWI. The Dutch Guilder (Dfl.) price is definitive. No extra costs will be added to prepaid orders.

CWI Monographs

1. MATHEMATICS AND COMPUTER SCIENCE — Proceedings of the CWI Symposium, November 1983
edited by J.W. de Bakker, M. Hazewinkel and J.K. Lenstra
The rapid development of both mathematics and computer science has created many new interrelations at their interface. All of the topics covered in this volume are relevant to both disciplines.
Contents: Stochastic Geometry and Image Analysis (*A.J. Baddeley*). Systematic Program Development (*C.B. Jones*). Algorithmic Aspects of Some Notions in Classical Mathematics (*L. Lovász*). Problems and Perspectives in Robotics (*J.T. Schwartz*). Algebra of Communicating Processes (*J.A. Bergstra* and *J.W. Klop*). Relaxation Times for Queueing Systems (*J.P.C. Blanc* and *E.A. van Doorn*). Some Current Developments in Density Estimation (*P. Groeneboom*). Experimental Mathematics (*M. Hazewinkel*). Numerical Analysis of Shallow Water Equations (*P.J. van der Houwen, B.P. Sommeijer, J.G. Verwer* and *F.W. Wubs*). Primality Testing (*H.W. Lenstra, Jr.*). Algorithmics (*L.G.L.T. Meertens*). Uniform Asymptotic Expansions of Integrals (*N.M. Temme*).

1986 viii + 352 pages
ISBN 0-444-70024-2 US $55.50 / Dfl. 150.00

2. STABILITY OF RUNGE-KUTTA METHODS FOR STIFF NONLINEAR DIFFERENTIAL EQUATIONS
by K. Dekker and J.G. Verwer
The object of this monograph is to present a unified account of all developments concerning stability of Runge-Kutta methods for stiff nonlinear differential equations, which began in 1975 with Dahlquist's *G*-stability paper and Butcher's *B*-stability paper.
Designed for the reader with a background in numerical analysis, the book contains numerous theoretical and practical results aimed at giving insight into the treatment of nonlinear problems.
Contents: Survey. 1. Stiff Differential Equations. 2. Contractivity and Stability. 3. Runge-Kutta Methods. 4. Contractivity of Runge-Kutta Methods. 5. Solution of the Algebraic Equations in Runge-Kutta Schemes. 6. Contractivity of Explicit Methods. 7. The Concept of *B*-Convergence. 8. The Concept of *D*-Stability. 9. Runge-Kutta Rosenbrock Methods. 10. Applications to Partial Differential Equations. Bibliography and Author Index. Subject Index. Symbol Index.

1984 x + 308 pages
ISBN 0-444-87634-0 US $36.50 / Dfl. 95.00

3. THE NUMERICAL SOLUTION OF VOLTERRA EQUATIONS
by H. Brunner and P.J. van der Houwen
This monograph presents the theory and modern numerical analysis of Volterra integral and integro-differential equations, including equations with weakly singular kernels.
While the research worker will find an up-to-date account of recent developments of numerical methods for such equations, including an extensive bibliography, the authors have tried to make the book accessible to the non-specialist possessing only a limited knowledge of numerical analysis.
After an introduction to the theory of Volterra methods and to numerical integration, the book covers linear methods and Runge-Kutta methods, collocation methods based on polynomial spline functions, stability of numerical methods, and it surveys computer programs for Volterra integral and integro-differential equations.
Contents: 1. An Introduction to the Theory of Volterra Equations. 2. Numerical Quadrature. 3. Linear Methods for Volterra Equations. 4. Runge-Kutta Type Methods for Volterra Equations. 5. Collocation Methods for Volterra Equations with Regular Kernels. 6. Volterra Equations with Weakly Singular Kernels. 7. Numerical Stability. 8. Software and Test Examples. Index.

1986 xvi + 588 pages
ISBN 0-444-70073-0 US $55.50 / Dfl. 150.00

4. MATHEMATICS AND COMPUTER SCIENCE II — Fundamental Contributions in The Netherlands since 1945
edited by M. Hazewinkel, J.K. Lenstra and L.G.L.T. Meertens
Showing the breadth and depth of fundamental research at CWI, these papers were presented at a symposium in October 1986, marking the fortieth anniversary of the Amsterdam Mathematical Centre.
Contents: The Numerical Solution of Partial Differential Equations (*A.O.H. Axelsson*). Dynamics in Bio-Mathematical Perspective (*O. Diekmann*). The Arch-Enemy Attacked Mathematically (*L. de Haan*). Process Algebra: Specification and Verification in Bisimulation Semantics (*J.A. Bergstra* and *J.W. Klop*). Codes from Algebraic Number Fields (*H.W. Lenstra, Jr.*). Infinite-Dimensional Normed Linear Spaces and Domain Invariance (*J. van Mill*). Geometric Methods in Discrete Optimization (*A. Schrijver*). Archirithmics or Algotecture? (*P.M.B. Vitányi*).

1986 x + 162 pages
ISBN 0-444-70122-2 US $40.00 / Dfl. 100.00

CWI Tracts

1. SURFACES WITH CANONICAL HYPERPLANE SECTIONS
by D. Epema
We study a special case of surfaces, characterized by the property that they can be embedded in some projective space in such a way, that a general hyperplane section is a canonical curve. We mainly focus on surfaces, which are birational to a ruled surface over an elliptic curve. This leads to a detailed description and classification of all quartics in $\mathbb{P}^3$ with either a singularity of genus 2, or with two simple elliptic singularities. We conclude with a discussion of the mixed Hodge structure on the cohomology groups of a certain open part of the minimal resolution of these surfaces, and the description of a period map for the double planes.

1984 106 pages
ISBN 90-6196-267-6 Dfl. 21.50

2. FAKE TOPOLOGICAL HILBERT SPACES AND CHARACTERIZATIONS OF DIMENSION IN TERMS OF NEGLIGIBILITY
by J.J. Dijkstra
A sequence $X_{-1}, X_0, X_1, \ldots$ is constructed of topologically complete AR spaces that have, among other things, the following properties: (1) X_n has the weak discrete approximation property; (2) homeomorphisms between compact subsets of X_n can be extended; (3) $X_n \times X_n$ is homeomorphic to ℓ^2, the separable Hilbert space; (4) if $A \subset X_n$ is a σ-compactum, then A is strongly negligible iff dim $A \leq n$; (5) if $A \subset X_n$ is a compactum of fundamental dimension at most n, then A is negligible (in particular, if $B \subset X_n$ is an m-cell, then B is negligible and B is strongly negligible iff $m \leq n$).
Our results were motivated by Toruńczyk's theorem that every AR with the strong approximation property is homeomorphic to ℓ^2. The construction is inspired by ideas in Anderson, Curtis and van Mill, *Trans. Amer. Math. Soc. 272 (1982) 311-321.*

1984 109 pages
ISBN 90-6196-268-4 Dfl. 22.80

3. SYSTEM THEORETIC DESCRIPTIONS OF PHYSICAL SYSTEMS
by A.J. van der Schaft
The dynamical behaviour of physical systems is described *including* their interaction with the environment, given as the time-evolution of the external variables. This framework is explored for set-theoretic, linear and smooth nonlinear systems, emphasizing a 'geometric' approach. The emphasis is on Hamiltonian systems. Furthermore, symmetries, conservation laws and time-reversibility are dealt with in this set ting, and the developed theory of Hamiltonian systems i applied to optimal control.

1984 256 pages
ISBN 90-6196-269-2 Dfl. 44.20

4. MINIMAL COST FLOW IN PROCESSING NETWORKS — A Pri mal Approach
by J. Koene
This tract is concerned with processing network problems The processing network structure appears among others i production planning environments in the process industr and in energy, assembly and economic models. Processin network problems can be solved by standard LP-programs but efficiency may be improved by exploiting the networ structure. Primal simplex algorithms are developed. W present a characterization of a basis in terms of the networ and yield a natural way to partition a basis. We provide a algorithm for solving processing network problems with addi tional linear constraints. The relation between processing net works and general linear programming is discussed. It i shown that any linear programming problem can b transformed to a pure processing network problem.

1983 157 pages
ISBN 90-6196-270-6 Dfl. 29.20

5. INTERTWINING FUNCTIONS ON COMPACT LIE GROUPS
by B. Hoogenboom
We consider a generalization, called intertwining functions of spherical functions on a compact semisimple Lie group These are matrix coefficients of some irreducible representa tion of U, which are left - K -, and right - H - invariant; K and H being the fixed point groups of two commuting invo lutions on U. It is shown that the intertwining functions o U can be considered as orthogonal polynomials on som region in $\mathbb{R}^l$ with respect to a certain positive weight func tion, and a structure theory for real semisimple Lie algebra with two commuting involutions is developed. We also prov a generalized Cartan decomposition for U, and finally th orthogonal polynomials constructed before are characterize as eigenfunctions of the K,H-radial part of the Laplace Beltrami operator on U.

1984 86 pages
ISBN 90-6196-271-4 Dfl. 19.10

6. DATAFLOW COMPUTATION
by A.P.W. Böhm
Dataflow computation is a particular kind of parallel compu tation. After a short overview of parallel computation and

discussion of the dataflow model of computation, an existing dataflow machine, the Manchester Dataflow Machine, is discussed. An elementary dataflow model, which differs from the widely accepted model of Rodriguez and Adams in that it mirrors the time-dependent, non-functional behaviour of dataflow machines, is shown to have universal computing power. A programming language DNP (Dynamic Networks of Processes) with explicit parallelism at the procedure level is introduced, and a number of algorithms in DNP, which are believed to be prototypical for dataflow computing, is analysed. It is shown that not all classes of computation graphs can be generated by DNP. Ways to overcome this are indicated. A comparison is made with the standard complexity classes. For these algorithms a correctness proof is given, based upon a semantics of DNP according to Kahn's ideas.

1983 208 pages
ISBN 90-6196-272-2 Dfl. 36.60

7. FEW-DISTANCE SETS
by A. Blokhuis
In this tract bounds are derived for the cardinality of point sets with few distances in Euclidean space and on the 'unit-sphere' of inner product spaces with arbitrary signature. Especially the case of hyperbolic space, R^d, yields sharp bounds. A theorem of Frankl and Wilson concerning few distances modulo a prime is generalized to Delsarte spaces. A problem of Erdös on few-distance point sets is shown to be related to 2-distance sets and solved. It is shown that graphs satisfying: (1) $\exists k$ such that each maximal clique has k points; (2) $\exists e$ such that each point p has e neighbours in any maximal clique not containing p, have a highly geometric structure, resembling that of polar spaces.

1984 70 pages
ISBN 90-6196-273-0 Dfl. 16.60

8. ALGORITHMS AND APPROXIMATIONS FOR QUEUEING SYSTEMS
by M.H. van Hoorn
Recursive computational schemes are given for the steady state probabilities and other performance measures for a wide class of single server and multi-server queues. Special attention has been paid to actual numerical calculations. In particular, the following models are analysed: the $M/G/1$ queue and the $M/G/c$ queue with uniform or state dependent arrivals rate, the $M^x/G/1$ queue with state dependent batch arrivals and the $H_2/G/1$ queue.

1984 122 pages
ISBN 90-6196-274-9 Dfl. 24.00

9. MODELS OF THE LAMBDA CALCULUS
by C.P.J. Koymans
The semantics of the lambda calculus is studied. The two conceptually different approaches: *lambda algebra* (functions as algorithms) and *lambda model* (functions as graphs) are unified using category theory. As an application of this approach the theory of derived models is studied. Finally the properties of a special model, viz. Sanchis' hypergraph model are studied. This turns out to be the first mathematical structure modelling combinatory logic, that cannot be expanded to a lambda model.

1984 181 pages
ISBN 90-6196-275-7 Dfl. 32.80

10. CALCULATION OF SPECIAL FUNCTIONS — The Gamma Function, the Exponential Integrals and Error-Like Functions
by C.G. van der Laan and N.M. Temme
Implementations for the numerical computation of special functions related to the Euler gamma function, exponential integrals and error functions are considered. The information includes: definitions, analytic properties, fundamental formulas, algorithms, implementations, error analysis, tabulated coefficients, testing. There is an introductory chapter on the literature and program libraries and a chapter on the theoretical background (error analysis, recurrence relations, continued fractions and generalized hypergeometric functions).

1984 231 pages
ISBN 90-6196-277-3 Dfl. 39.40

11. CONTROLLED MARKOV PROCESSES — Time-Discretization
by N.M. van Dijk
This study investigates the method of time-discretization in order to approximate continuous-time controlled Markov processes and corresponding finite horizon cost functions. We concentrate on approximations induced by discrete-time controlled Markov processes. As a result, by applying discrete-time dynamic programming, we can compute the approximations. Much attention is paid to analysing a specific discretization for controlled Markov jump and controlled diffusion processes.

1984 166 pages
ISBN 90-6196-279-X Dfl. 30.30

12. THE NUMERICAL SOLUTION OF NONLINEAR STIFF INITIAL VALUE PROBLEMS — An Analysis of One-Step Methods
by W.H. Hundsdorfer
A general class of one-step methods for the numerical solution of stiff initial value problems is analysed, including

implicit Runge-Kutta, Rosenbrock, ROW and adaptive Runge-Kutta methods. The main subjects are the feasibility of the methods and their nonlinear stability properties.

1985 138 pages
ISBN 90-6196-283-8 Dfl. 26.60

13. On the Design of ALEPH
by D. Grune
This tract emphasizes the similarity between grammars and programs. The relation between the input and the output of a program can be described by a (two-level or affix) grammar, which can then be viewed as parsing the input while at the same time producing the output. A practical system based on these principles, ALEPH, is explained in detail.

1986 194 pages
ISBN 90-6196-284-6 Dfl. 34.10

14. Analytic Spaces and Dynamic Programming
by J.G.F. Thiemann
Parts of the theory of analytical topological spaces are developed within a purely measure-theoretic framework, and applied to dynamic programming. This results in a formalism for dynamic programming involving no topology. Moreover, this formalism allows more general strategies than existing formalisms.

1985 96 pages
ISBN 90-6196-285-4 Dfl. 19.20

15. Euclidean Rings with Two Infinite Primes
by F.J. van der Linden
In this tract all earlier results about the classification of (norm-)Euclidean subrings with two infinite primes of global fields are combined. Moreover a total classification is given for subrings with two infinite primes in complex quadratic fields. For rings of integers of certain quartic fields new results are derived, such as the determination of all Euclidean rings of integers of cyclic quartic totally complex fields.

1985 196 pages
ISBN 90-6196-286-2 Dfl. 34.10

16. Mixed Elliptic-Hyperbolic Partial Differential Operators — A Case Study in Fourier Integral Operators
by R.P.J. Groothuizen
The utility of Fourier Integral Operators (FIO) is tested for the study of two types of partial differential operators of mixed elliptic-hyperbolic type, viz. the Tricomi and Pseudo Tricomi operator. Fundamental solutions in $\mathbb{R}^{n+1}$ are constructed using adapted FIO-techniques. Moreover, boundary value problems for the Tricomi operator with distributional data are discussed. An extensive summary of the theory of FIO is included.

1985 145 pages
ISBN 90-6196-287-0 Dfl. 27.80

17. Symmetries for Dynamical and Hamiltonian Systems
by H.M.M. ten Eikelder
Symmetries and adjoint symmetries of a dynamical system $\dot{u}=X(u)$ on a manifold are introduced as possibly $(t-)$ parametrized vector fields or one-forms which are invariant for the flow corresponding to the vector field X. Moreover, we show how to use differential geometrical methods for certain infinite-dimensional systems and give function spaces in which some infinite-dimensional systems can be considered. Finally, a number of examples is given.

1985 191 pages
ISBN 90-6196-288-9 Dfl. 34.10

18. Some Large Deviation Results in Statistics
by A.D.M. Kester
This treatise concerns parameter estimation and Bahadur efficiency. Taking the probability of missing the parameter by a fixed amount as a criterion for the quality of estimators, we prove that in convex exponential families the maximum likelihood estimator has optimal inaccuracy rate (the standardized leading term of this probability). Properties of estimators are furthermore studied in curved exponential families and in shift families on the real line. Furthermore, it is proved that the uniformly most powerful unbiased classical two-sample conditional test is not only fully efficient with respect to most powerful tests, but also that its Bahadur deficiency is finite.

1985 135 pages
ISBN 90-6196-289-7 Dfl. 25.30

19. Foundations and Applications of Montague Grammar — Part 1: Philosophy, Framework, Computer Science
by T.M.V. Janssen
This tract is the first of two volumes, based on the author's Ph.D. work. Volume 1 contains an application of Montague grammar to programming languages, whereas volume 2 deals with the consequences for natural languages. Many facets of syntax and semantics are discussed, ranging from abstract universal algebra to linguistic observations, from the history of philosophy to formal language theory, and from idealized computers to human psychology.

1986 206 pages
ISBN 90-6196-292-7 Dfl. 36.60

20. Order Dependence
by B.F. Schriever
Some aspects of the statistical analysis of ordered contingency tables are considered. Basic properties of Correspondence Analysis (CA) and asymptotic properties of tests of independence based on statistics produced by CA are derived. When the bivariate contingency table shows a specific form of ordinal dependence, related to Lehmann's notion of positive regression dependence, CA possesses a practically useful ordering property. Tests of independence sensitive to this form of positive dependence are discussed. Also, a partial ordering for positive dependent distributions is introduced such that these and other familiar tests become more powerful under 'increasing' positive dependence. Finally, ordering properties of a multivariate generalization of CA are given.

1986 115 pages
ISBN 90-6196-294-3 Dfl. 22.80

21. Inequalities for Stopped Brownian Motion
by D.P. van der Vecht
In this tract the Blackwell-Dubins bound is derived directly for standardly stopped Brownian motion. A similar (least) upperbound is obtained for the maximum of the norm of standardly stopped d-dimensional Brownian motion.

1986 88 pages
ISBN 90-6196-296-X Dfl. 19.10

22. Topological Dynamix
by J.C.S.P. van der Woude
The main theme of this tract is the structure theory for minimal flows, following the works of Auslander, Ellis, Furstenberg, Glasner, Veech and others. The central notions are: quasifactors of minimal flows, (weak) disjointness of flow homomorphisms, and the equicontinuous structure relation.

1986 298 pages
ISBN 90-6196-298-6 Dfl. 50.40

23. Methods, Concepts and Ideas in Mathematics — Aspects of an Evolution
by A.F. Monna
This tract consists of three parts which are basically a revised version - in English - of three papers published earlier in French by the same author in the series: 'Communication of the Mathematical Institute Rijksuniversiteit Utrecht', scil.: 'L'algébrisation de la Mathématique' (1977), 'Evolutions de problèmes d'existence en Analyse' (1979) and 'Evolutions en Mathématique' (1981). An extensive bibliography (160 titles) and an index of mathematicians are included.

1986 170 pages
ISBN 90-6196-299-4 Dfl. 31.70

24. Filters and Ultrafilters over Definable Subsets of Admissible Ordinals
by J.C.M. Baeten
The search for a recursive analogue of a measurable cardinal leads to a study of ordinals that have a filter, which is complete, normal or an ultrafilter on a Boolean algebra of definable subsets. Techniques from definability theory, set theory and recursion theory are combined and the hierarchy of constructible sets is used. The existence of these so-called definable filters is related to admissibility, and we find that the existence of a definable normal (ultra)filter is not equivalent to the existence of a definable (ultra)filter. We look at the analogues of certain classical filters, and prove that on a countable ordinal, we can extend a definable filter to a definable ultrafilter, and a definable normal filter to a definable normal ultrafilter.

1986 77 pages
ISBN 90-6196-301-X Dfl. 17.70

25. Tree Network and Planar Rectilinear Location Theory
by A.W.J. Kolen
It is shown that chordal graphs and totally-balanced matrices are useful tools in finding strong duality results and polynomial time algorithms for tree networks location problems. For planar location problems using the rectilinear (Manhattan) distance it is shown that Farkas' lemma can be used successfully.

1986 85 pages
ISBN 90-6196-300-1 Dfl. 19.10

26. The Misconstrued Semicolon — Reconciling Imperative Languages and Dataflow Machines
by A.H. Veen
This tract deals with three subjects: dataflow machines, analysis of imperative programs and the use of analysis to make programming of dataflow machines possible. Chapter two contains a comprehensive survey of dataflow machines, while chapter three elaborates on the differences between applicative languages and imperative languages, especially in relation to dataflow machines. Chapter four discusses the area of flow analysis and compares some existing methods. The general analysis method is described in chapter five; it

subsequently treats syntactic analysis, demand graph construction, demand propagation and extraction. Chapter six contains a detailed description of the crucial part of the analysis method: the construction of the demand graph. Chapter seven gives examples of the application specific propagation of demands and chapter eight describes the generation of code for the Dataflow Machine. Finally, in chapter nine the compiler is evaluated.

1986 180 pages
ISBN 90-6196-302-8 Dfl. 32.80

27. Homogeneous Zero-Dimensional Absolute Borel Sets
by A.J.M. van Engelen
In this tract, topological characterizations are given of all homogeneous zero-dimensional absolute Borel sets; there turn out to be ω_1 topological types of such spaces. They mainly consist of a description of the level in the Borel hierarchy of the spaces under consideration. For this purpose we use the hierarchy of small Borel classes (Kuratowski), and the Wadge hierarchy (Wadge). As an application of our results, we prove that non-trivial *rigid* zero-dimensional absolute Borel sets do not exist, answering a question of Van Douwen.

1986 133 pages
ISBN 90-6196-303-6 Dfl. 25.30

28. Foundations and Applications of Montague Grammar — Part 2: Applications to Natural Languages
by T.M.V. Janssen
See CWI Tract 19.

1986 283 pages
ISBN 90-6196-306-0 Dfl. 47.90

29. Almost Invariant Subspaces and High Gain Feedback
by H.L. Trentelman
In this tract a theory is developed around the notion of 'almost controlled invariance'. The theory presented mainly falls within the area of research commonly known as the 'geometric approach' to linear systems, but also more 'frequency domain oriented' methods are used. The work consists of five chapters. In chapter one the basic concepts of controlled invariance and almost controlled invariance are introduced. Chapter two provides characterizations in terms of distributional inputs. As a first application, the L_p/L_q-almost disturbance decoupling problem is discussed. In chapter three the notion of L_p-almost invariance is treated. The L_p-almost disturbance decoupling problem is discussed and results are provided in the context of pole placement by low-order dynamic output feedback. Chapter four treats the L_p-almost disturbance decoupling problem with bounded peaking. Finally, in chapter five, a theory around the dual concept of almost conditionally invariant subspaces is developed.

1986 239 pages
ISBN 90-6196-308-7 Dfl. 41.80

30. Production-Inventory Control Models — Approximations and Algorithms
by A.G. de Kok
This tract concerns the probabilistic analysis of a variety of one-product production-inventory models in which the central problem is to coordinate the production rate with the inventory level in order to cope with random fluctuations in demand. Here the main goal is to meet service level constraints corresponding to service measures such as the long-run fraction of the demand to be met directly from stock on hand, while minimizing the average costs. Here we account for linear holding costs and a fixed cost for changing the production rate. The control of the inventory is governed by a so-called *(m,M)*-rule. Using results from random walk theory and renewal theory accurate and practically useful approximations are obtained for all performance characteristics, from which the optimal control levels m and M can be computed.

1987 211 pages
ISBN 90-6196-310-9 Dfl. 38.00

CWI Syllabi

1. VACANTIECURSUS 1984: HEWET-PLUS WISKUNDE
This syllabus (in Dutch), for high-school teachers of mathematics, contains fourteen articles on operations research, matrix algebra, statistics and probability theory, geometry in three-dimensional space, mathematical modelling, and computer science.

1984 233 pages
ISBN 90-6196-276-5 Dfl. 40.40

2. PROCEEDINGS SEMINAR 1981-1982 MATHEMATICAL STRUCTURES IN FIELD THEORIES
edited by E.M. de Jager and H.G.J. Pijls
Reflecting the growing mutual interest between mathematicians and physicists, a national seminar 'Mathematical Structures in Field Theories' started in 1981 at the University of Amsterdam. This syllabus contains the lectures in the academic year 1981-1982. The programme of this first year seminar was mainly directed to differential geometry and gauge field theory. In order to give participants a better understanding of theories in which they are not fully conversant, some of the lectures are of an introductory character.

1984 217 pages
ISBN 90-6196-278-1 Dfl. 38.00

3. TESTING STATISTICAL HYPOTHESES — Worked Solutions
by W.C.M. Kallenberg et al.
This syllabus contains complete worked solutions to all the 228 exercises in E.L. Lehmann's book 'Testing Statistical Hypotheses', Wiley and Sons, New York, which was first published in 1959 and has since become a classic in the statistical literature. It should be especially useful to those using the book in statistics courses and for private study.

1984 310 pages
ISBN 90-6196-280-3 Dfl. 52.90

4. COLLOQUIUM TOPICS IN APPLIED NUMERICAL ANALYSIS — Vol. 1
edited by J.G. Verwer
The colloquium 'Topics in Applied Numerical Analysis' was held at CWI during the academic year 1983-1984. Its aim was to draw attention to the widespread use of numerical mathematics in real life scientific problems, as well as to foster co-operation between mathematicians working in an academic environment and representatives from industries and institutes where the numerical solution of real life problems is studied. The proceedings, consisting of two volumes, contain in complete form all 24 papers presented by the speakers in the colloquium. Most of the papers deal with practical problems, mainly arising in the engineering sciences.

1984 253 pages
ISBN 90-6196-281-1 Dfl. 44.20

5. COLLOQUIUM TOPICS IN APPLIED NUMERICAL ANALYSIS — Vol. 2
edited by J.G. Verwer
See CWI Syllabus 4.

1984 229 pages
ISBN 90-6196-282-X Dfl. 40.40

6. PROCEEDINGS SEMINAR 1982-1983 MATHEMATICAL STRUCTURES IN FIELD THEORIES
by P.J.M. Bongaarts, J.N. Buur, E.A. de Kerf, R. Martini, H.G.J. Pijls and J.W. de Roever
The lectures in this syllabus cover the basics of quantum field theory and Yang-Mills gauge theories, suitable to mathematicians who desire to know more about physics and physical intuition underlying this field, and suitable to theoretical physicists who need to know more about the mathematical techniques involved. Topics covered: Feynman path integral and perturbation quantum field theory, topological solutions and Derricks theorem, fields and Lagrangians, the Ward Ansatz for Y.-M. potentials, massless field equations, shear cohomology, Penrose transform.

1985 250 pages
ISBN 90-6196-290-0 Dfl. 42.90

7. VACANTIECURSUS 1985: VARIATIEREKENING
The calculus of variations is the central theme of this syllabus (in Dutch). Chapter one deals with the creation of the calculus of variations while chapter two treats some aspects of this subject. Chapter three discusses minimax methods and chapter four consistent approximations in mathematical physics. Calculus of variations and numerical analysis is described in chapter five (finite-element method). Duality in optimization is discussed in chapter six. Finally, chapter seven deals with variational inequalities with applications to the so-called 'obstacle' and 'membrane problem'.

1985 245 pages
ISBN 90-6196-291-9 Dfl. 42.90

8. PROCEEDINGS SEMINAR 1983-1985 MATHEMATICAL STRUCTURES IN FIELD THEORIES — Vol. 1: Geometric Quantization
by G.M. Tuynman
This syllabus gives explanations and (heuristic) motivations for the fundamental concepts of geometric quantization: the

prequantization line bundle, polarizations and the metalinear correction. After each step several examples are given and for each new feature, the influence on the example is studied.

1985 158 pages
ISBN 90-6196-293-5 Dfl. 29.20

9. PARALLEL COMPUTERS AND COMPUTATIONS
edited by J. van Leeuwen and J.K. Lenstra
In the Autumn of 1983 eight experts of different backgrounds delivered lectures at the University of Utrecht on various aspects of 'parallel computers and computations'. The lectures covered concrete supercomputer architectures and their programming, the new challenges for systems programming, the design of numeric and combinatorial parallel algorithms, and the complexity of parallel computations. This syllabus contains the full versions of the papers that were presented.

1985 184 pages
ISBN 90-6196-297-8 Dfl. 34.10

10. VACANTIECURSUS 1986: MATRICES
This course (for high school mathematics teachers) covers a number of applications of matrices. Many different types of matrices (real, positive, complex, integer, partitioned,...) exist as well as many classes of matrices with special properties, each requiring its own 'theory'. Here, the emphasis is on applications. This syllabus is written in Dutch.

1986 162 pages
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