

THE AUSTRALIAN NATIONAL UNIVERSITY

CENTRE FOR MATHEMATICAL ANALYSIS

ANNUAL REPORT 1985

Previous high levels of research activity in the Centre for Mathematical Analysis were maintained in 1985 although with the late notification of funding in 1984 it was not possible to plan activities as effectively as in the preceeding two years. Nevertheless fifty one research reports with an average page length over 30 pages were produced and about forty mathematicians drawn from around Australia and overseas were involved in the Centre's research programme. Strong evidence of the Centre's continuing success is provided by the many positive unsolicited comments and by the high regard in which the Centre is held by the international mathematical community.

ADMINISTRATION

The Director is responsible to the Vice-Chancellor, through the Chairman of the Board of the Faculties, for the administration of the Centre. In planning and executing the academic program he is assisted by an advisory group comprising Professor R.P. Brent, Department of Computer Science, Faculty of Science, A.N.U., Professor L.M. Simon, Department of Mathematics, Research School of Physical Sciences, A.N.U., Dr. R.S. Anderssen and Dr. F.R.de Hoog, Division of Mathematics and Statistics, C.S.I.R.O., and Professor A.G.R. McIntosh, School of Mathematics and Physics, Macquarie University.

STAFFING MATTERS

Professor Brent was seconded until September when he took up a new Chair in the Department of Engineering Physics, Research School of Physical Sciences. Dr. R. Bartnik, from Stanford University, was appointed as a Research Fellow from September and Dr. Newsam was appointed jointly as a Research Fellow and Lecturer in the Department of Mathematics from March. Dr. Williams resigned in February to accept a lectureship at the University of Wollongong. Dr. J. Hutchinson from the Department of Mathematics and Dr. F. de Hoog from the Division of Mathematics and Statistics, C.S.I.R.O. were seconded during the first and second halves of 1985 respectively. Dr. Fusco returned to the University of Naples in March. Professor Griewank from Southern Methodist University, Dallas, spent the year at the CMA on sabbatical leave, while Professors Solomon from Indiana University and White from Stanford University held Visiting Fellowships during the second half of the year. Professor Solomon, along with Professor Korevaar from the University of Kentucky, who visited from September to December, were largely supported by U.S. National Science Foundation Postdoctoral Fellowships. Drs. A. Kennington and D. Cullen served as Research Assistants during the first and second half respectively of 1985. Twenty one short term Visiting Fellows listed below were also appointed during 1985. Professor Wendland's visit was supported by a grant from the West German Government.

RESEARCH ACTIVITIES

As in previous reports, the research of the Centre is divided into two interwoven areas: (i) theoretical mathematics with emphasis on

partial differential equations; and (ii) computational and applied mathematics. The following is a brief summary of Centre supported research in 1985. Research by associate members supported by the Centre is also taken into account.

(i) THEORETICAL MATHEMATICS

Professor Trudinger continued work on nonlinear elliptic equations and in collaboration with P-L Lions of the University of Paris and J. Urbas established sharp results for the solvability of the Neumann problem for general equations of Monge-Ampere type [Report R16]. A new approach to the classical Schauder estimates was also developed, [to appear 1986].

Dr. Bartnik completed work on the geometric nature of mass using tools from partial differential equations [Report R33].

Dr. Fusco and Dr. Hutchinson undertook collaborative research on the regularity of vector valued solutions of multiple integral problems in the calculus of variations resulting in two papers [Reports R27, R40].

Professor Yan studied the regularity of solutions of elliptic and parabolic equations [Reports R36, R37].

Professors Simon, Solomon and White engaged in various collaborative projects on area minimizing hypersurfaces [Reports R34, R35]. Professor Simon proved important new results pertaining to the existence of smooth extremals for variational problems involving curvature. In addition Dr. White delivered a series of lectures on his recent work on isoperimetric inequalities.

Dr. Kennington studied various degenerate elliptic equations with a view to giving a new proof of Huisken's contraction result [Report R10, 1984].

As usual the Centre's research output was also enhanced significantly by further contributions from Visiting Fellows and Associates in partial differential equations [Reports R05, R09, R21, R23, R39, R43, R50], operator theory [Reports R17, R18, R46] and differential geometry [R38, R51].

(ii) COMPUTATIONAL AND APPLIED MATHEMATICS

Several collaborative ventures were devoted to the production of algorithms for resolving mathematical problems. In particular Professors Brent and Dr. Bojanczyk developed parallel algorithms for greatest common division problems for implementation on systolic arrays [Report R29] and together with Dr. de Hoog made substantial improvements to existing algorithms for factorization of Toeplitz matrices [Reports R06, R07] and with Drs. de Hoog and Vandooren proposed a new algorithm for downdating Cholesky factorizations [Report R19]. Dr. de Hoog, with Dr. M. Hutchinson of the C.S.I.R.O., also constructed efficient algorithms for calculating smoothing splines [Report R27] and with Dr. Mattheij constructed algorithms for solving multipoint boundary problems [Report R31].

Professor Brent continued testing his new dynamic storage algorithms [Reports R33, R37, 1984]. He also developed new algorithms for factorizing large integers based on elliptic curves [Report R32] and, jointly with Dr. Mackay of the Department of Computer Science, produced recurrence relations for numbers of matrices of given rank [Report R25].

Dr. Miller continued his participation in a collaborative venture with the CSIRO Divisions of Manufacturing Technology and Mathematical Statistics on the development of numerical simulations of the solidification of steel castings. As well, other existing

collaborations with I. Babuska of the University of Maryland on adaptive finite element methods and with Dr. Dewar, Department of Theoretical Physics, R.S.Phys.S., on plasma stability were further advanced.

Dr. Newsam continued his studies on the numerical solution of ill-posed problems, partly in collaboration with R. Barakat of Harvard University. Professor Griewank further developed his application of secant methods to optimization problems and nonlinear equations with many variables [Reports R20, R22, R45], and investigated the phase behaviour of mixed fluids from a computational point of view [Report R42].

Dr. Cullen's research was concerned with the applications of commutative algebra to dynamical systems and control theory with a view to providing systems engineers with better tools for selecting frequencies [Reports R11, R12, R14, R47, R48, R49].

Further applied research was carried out by short term visitors and associates and some of this, from 1984 as well as 1985, is covered by the research reports R01, R02, R03, R04, R15, R26, R30, R41, R44. The research undertaken by Dr. Markowich formed the basis for part of his book on semiconductors [31]. Dr. Anderssen as well as his contribution to the solidification project, initiated new industrial work on welding speed and engaged in further collaborative research on data analysis with I. Koch of the CSIRO and R. Davies (Visiting Fellow, 1984).

CONFERENCES AND TRAVEL

Members of the Centre participated in the Summer Research Institute of the Australian Mathematical Society in Auckland in January, the Annual Meeting of the Division of Applied Mathematics at Launceston in February, the Eighth Computer Science Conference in Melbourne in

February and the Computational Techniques and Applications Conference in Melbourne in August.

In addition Professor Trudinger gave an Invited Lecture at an international conference on differential equations, Equadiff 6, in Brno, Czechoslovakia in August followed by a visit to the Czechoslovakian Academy of Science in Prague and lectures at Linköping University, Chalmers University and the Mittag-Leffler Institute in Sweden. In November, Professor Trudinger gave four weeks of advanced research lectures at the newly created Nankai Institute of Mathematics in Tianjin, China followed by a visit to Beijing University.

Dr. Newsam visited Harvard University and attended a conference on Mathematics in Signal Processing at Bath in England.

Dr. Hutchinson visited the Universities of Bonn and Naples in June-July.

The Centre organised a Miniconference on Geometry and Partial Differential Equations in July which was well supported by mathematicians from other Australian universities as well as Centre visitors. A significant portion of the Centre's research is also embodied in the Proceedings of this conference to appear in 1986.

Many Centre members, particularly Visiting Fellows, visited other Australian universities to give seminars and colloquia.

SEMINAR ACTIVITY

The main seminar activity was the Colloquium (program attached). In addition regular weekly seminars on Partial Differential Equations, Numerical Analysis, Functional Analysis, Geometric Measure Theory and Analytic Methods in Geometry were held.

PUBLICATIONS

The Centre produced fifty one research reports and one volume of its Proceedings in 1985. Details are attached as well as references to publications of CMA personnel which appeared in 1985.

GRANTS

Dr. Newsam was awarded subcontracts as a consultant on data analysis data on a NERDDL contract to study commercial building energy use.

HONOURS

A paper written by a Visiting Fellow, L. Trefethen while at the CMA in 1982 (Report R02, 1983; Reference 50, 1984) won the 1985 Fox prize from Oxford University for the best paper by a numerical analyst under the age of 30.

OTHER ACTIVITIES

Professor Trudinger was elected a Vice-President of the Australian Mathematical Society and served on the Editorial board of the international journal, Annales de L'Institut Henri Poincare.

Professor Brent served as a member of the International Federation for Information Processing (IFIP) Working Group 2.5 on Numerical Software, as Secretary of the Association of Australian Professors of Computer Science (until February), as an Associate Editor of the journal Numerische Mathematik, as an international coordinator for the ACM Special Interest Group on Numerical Mathematics (SIGNUM), as an

advisor to IMSL Inc. (a firm which produces mathematical and statistical software), as a member of the Australian Academy of Science National Committee for Mathematics, as a member of the Council and Steering Committee of the Australian Mathematical Society, as a member of the CSIRO Cyber 205 Computing Grants Committee, as a member of the program committee for the Second International Symposium on VLSI Technology, Systems and Applications (held in Taipai, 8-10 May), as a member of the program committee for Microelectronics '85 (held in Sydney, May), as a member of the Review Committee on Mathematical Sciences at Victoria University (Wellington, NZ), and on two promotions committees at the University of Sydney.

Dr. Anderssen, in conjunction with his direction of the CMA-CSIRO project on solidification, was appointed a member of the Solidification Simulation Panel of the Foundry Industry Research Committee of the Metal Trades Industry Association. He was re-elected President of the Australian Mathematical Society and was elected as Treasurer of the newly created Federation of Australian Scientific and Technological Societies.

COLLOQUIA 1985

(ii)

- February 14 Professor Derek Robinson (Maths Dept, IAS, ANU)
"Locality and Integration in C^* -Dynamical Systems"
- February 21 Professor Ralph Phillips (Stanford University),
"The Laplacian for Domains in Hyperbolic Space and
Limit Sets of Kleinian Groups"
- February 28 Professor Vidar Thomée (Chalmers University, Sweden)
"Error estimates for Galerkin approximations of
parabolic problems with non-smooth data"
- March 14 Dr. Peter Markowich (Technische Universität Wien)
"Analytical and Numerical Modeling of Semi-Conductor Devices"
- March 21 Professor Andreas Griewank (Southern Methodist University,
Texas)
"Rates of Convergence for Newton Like Methods in Hilbert
Space Operators and their Discretizations"
- March 28 Professor Neil Trudinger (Centre for Mathematical Analysis)
"Obstacles and optimal stopping"
- April 18 Professor Dr. W. Wendland (Technische Hochschule Darmstadt)
"Boundary Integral Methods in Connection with Singularities
Due to Corners and Cracks"
- April 24 Dr. A. Bojańczyk (Centre for Mathematical Analysis)
"QR Factorization of Toeplitz Matrices"
- May 2 Dr. Rainer Wehrse (Astrophysik Institute Heidelberg)
"Numerical Methods and Problems in the Analysis of
Stellar Spectra"
- May 9 Dr. Terry Speed (CSIRO Division of Mathematics and Statistics)
"Convergence of an Ace Algorithm"
- May 23 Professor Roger Fletcher (University of Dundee)
"An ℓ_1 Penalty Method for Nonlinear Constraints"
- May 29 Professor Peter Hess (University of Zurich)
"On positive solutions of periodic-parabolic problems"
- May 30 Mr. Masood-Ul-Alam (Mathematics Dept., I.A.S.)
"Topology of Asymptotically Euclidean Static Perfect
Fluid Space-Time"
- June 6 Professor Bruce Solomon (Indiana University)
"A sturm separation theorem for Harmonic maps, with
applications"
- June 20 Professor Emmanuele Di Benedetto (Northwestern University)
"On the Local Behaviour of Solutions of Degenerate Parabolic
Equations with Measurable Coefficients"
- June 27 Professor Richard Brent (Centre for Mathematical Analysis)
"Determinants and Ranks (Mod m) of Random Integer Matrices"

- July 4 Dr. Jim Michael (University of Adelaide)
"Boundary Value Behaviour for Solutions of Obstacle Problems"
- July 11 Mr. Ezra Getzler (Harvard University)
"String Theory: Loop Spaces and Physics"
- July 18 Professor Brian White (Stanford University)
"Homotopy Classes"
- July 25 Professor Jon Pitts (Texas A & M University)
"Boundaries Spanned by an Infinite Number of Minimal Surfaces"
- August 1 Professor Francois Treves (Rutgers University)
"Overdetermined Systems Defined by Complex Vector Fields"
- August 8 Professor Gary Lieberman (Iowa State University)
"The Perron Process with Boundary Regularity for Elliptic Equations"
- August 15 Professor Stefan Hildebrandt (University of Bonn)
"Harmonic Mappings of Riemannian Manifolds"
- August 22 Dr Bob Mattheij (Katholieke University, The Netherlands)
"Direct Solution of Linear Systems with a Sparse Block Structure"
- August 29 Professor T.C. Hu (University of California San Diego)
"Global Routing on a Chip"
- September 5 Professor K.G. Morton (Oxford University)
"Petrov-Galerkin Methods for Steady Diffusion-Convection Problems"
- September 12 Dr. Gerhard Huisken (Heidelberg University)
"Evolution Equations in Differential Geometry"
- September 19 Dr. Robert Bartnik (Centre for Mathematical Analysis)
"Mass on Asymptotically Flat Manifold"
- September 26 Dr. Paolo de Bartolomeis (University of Florence)
"Harmonic maps with values in $P^m(\mathbb{C})$ "
- October 2 Dr. Collin Sparrow (Cambridge University)
"The Lorenz equation and codimensions to homoclinic bifurcations"
- October 10 Professor N. Korevaar (University of Kentucky)
"Nonparametric Capillary Surfaces"
- October 17 Dr. Stefan Luckhaus (Heidelberg University)
"A Stefan Problem in Combustion"
- October 24 Dr. J.M. Murray (University of New South Wales)
"Optimal Control and Calculus of Variations with Jumps in the State Variables"

- November 7th Dr. Mario Micallef (University of Michigan)
"Stable minimal surfaces in Euclidean Space"
- November 21 Dr. F. de Hoog (Centre for Mathematical Analysis)
"The Stability of Multipoint Boundary Value Problems
for Ordinary Differential Equations"
- November 28 Dr. Paul Pritchard (University of Queensland)
"The Wheel Sieve Stands Up"
- December 4 Dr. A. Mees (University of Western Australia)
"How chaotic is Chaos?"
- December 12 Dr. C.P. Lau (Dept. of Mathematics, IAS, ANU)
"On Removable Singularities of the Prescribed Mean
Curvature Equation"

OFFICIAL PUBLICATIONS 1985

(iii)

PROCEEDINGS

Vol.9 Miniconference on Linear Analysis and Function Spaces,
 Edited by Alan G.R. McIntosh and Alan J. Pryde

RESEARCH REPORTS

CMA-R01-85	A.R. Davies and R.S. Anderssen	Improved Estimates of Statistical Regularization Parameters in Fourier Differentiation and Smoothing
CMA-R02-85	F. Stummel	Fortran-Programs for the Rounding Error Analysis of Gaussian Elimination
CMA-R03-85	F. Stummel	Basic Concepts of Forward Error Analysis
CMA-R04-85	J.F. Toland and M.C.W. Jones	The Bifurcation and Secondary Bifurcation of Capillary-Gravity Waves
CMA-R05-85	John Urbas	The generalized dirichlet problem for equations of Monge-Ampère type
CMA-R06-85	A.W. Bojanczyk, R.P. Brent and F.R. de Hoog	Linearly Connected Arrays for Toeplitz Least Squares Problems
CMA-R07-85	A. Bojanczyk, F.R. de Hoog and R.P. Brent	QR Factorization of Toeplitz Matrices
CMA-R08-85	Nicola Fusco and John Hutchinson	$C^{1,\alpha}$ Partial Regularity of Functions Minimising Quasi-convex Integrals.
CMA-R09-85	John Urbas	Global Hölder Estimates for Equations of Monge-Ampère type
CMA-R10-85	Andreas Griewank	Rates of Convergence for Secant Methods on nonlinear Problems in Hilbert Space
CMA-R11-85	David Cullen	Local System Equivalence
CMA-R12-85	David Cullen	State-space Realisations at Infinity
CMA-R13-85	Leon Simon and Bob Hardt	Seminar on Geometric Measure Theory
CMA-R14-85	David Cullen	An Algebraic Condition for Controllability at Infinity
CMA-R15-85	William McLean	A Computational Method for Solving a First Kind Integral Equation
CMA-R16-85	P.-L. Lions N.S. Trudinger J.I.E. Urbas	The Neumann Problem of Equations of Monge- Ampère type
CMA-R17-85	Brian Jefferies	Pettis Integrals with Singular Kernels
CMA-R18-85	Brian Jefferies	Pettis Integral Operators and Resolvents

CMA-R19-85	A.W. Bojanczyk R.P. Brent P. Vandooren F.R. de Hoog	A Note on DOWDATING the Cholesky Factorization
CMA-R20-85	Andreas Griewank	The "global" Convergence of Broyden-like Methods with a Suitable Line Search.
CMA-R21-85	H.W. Alt E. Di Benedetto	Regularity of the Saturation in the Flow of Two Immiscible Fluids through a Porous Medium.
CMA-R22-85	Andreas Griewank	The Solution of Boundary Value Problems by Broyden-based secant methods.
CMA-R23-85	Gary Lieberman	Intermediate Schauder Theory for Oblique Derivative Problems in Lipschitz Domains.
CMA-R24-85	A.D. Miller R.L. Dewar	Galerkin Method for Differential Equations with Regular Singular Points
CMA-R25-85	R.P. Brent B.D. McKay	Determinants and Ranks (mod m) of Random Integer Matrices
CMA-R26-85	Åke Björck	Stability Analysis of the Method of Semi-normal-equations for linear least squares Problems.
CMA-R27-85	F.R. de Hoog M.F. Hutchinson	Two Fast Procedures for Calculating Smoothing Splines
CMA-R28-85	R.S. Anderssen	The Lanczos Methods and the Rayleigh Quotient
CMA-R29-85	A.W. Bojanczyk R.P. Brent	A Systolic Algorithm for Extended GCD Computation
CMA-R30-85	A.R. Davies R.S. Anderssen	Optimization in the Regularization of ill-posed problems
CMA-R31-85	F.R. de Hoog R.M.M. Mattheij	An Algorithm for solving Multi-point Boundary Value Problems
CMA-R32-85	R.P. Brent	Some Integer Factorization Algorithms using elliptic curves.
CMA-R33-85	Robert Bartnik	The Mass of an Asymptotically Flat Manifold
CMA-R34-85	Leon Simon and Bruce Solomon	$S^p \times S^q$ -type minimal hypersurfaces in Euclidean space
CMA-R35-85	Bruce Solomon	On Foliations of $\mathbb{R}^{n+1}$ by Minimal Hypersurfaces
CMA-R36-85	Yan Ziqian	Everywhere Regularity for Solutions to Quasilinear Elliptic Systems of Triangular Form

CMA-R37-85	Yan Ziqian	L^p -Regularity and Hölder Continuity for Solutions of Second Order Parabolic Systems
CMA-R38-85	Brian White	Complete Surfaces of Finite Total Curvature
CMA-R39-85	Nick Korevaar	A Priori Interior Gradient Bounds for Solutions to Elliptic Weingarten Equations
CMA-R40-85	Nicola Fusco and John Hutchinson	Partial Regularity for Minimizers of Certain Functionals having Non-quadratic Growth
CMA-R41-85	Graeme Chandler and I.G. Graham	Product Integration-Collocation Methods for Non Compact Integral Operator Equations
CMA-R42-85	Andreas Griewank	On the phase behaviour analysis of mixed fluids as a difficult semi-infinite programming problems
CMA-R43-85	E.N. Dancer and Peter Hess	On Stable Solutions of Quasilinear Periodic-Parabolic Problems
CMA-R44-85	G.A. Chandler and I.G. Graham	Uniform Convergence of Galerkin Solutions to Noncompact Integral Operator Equations
CMA-R45-85	Andreas Griewank	The Local Convergence of Broyden-Like Methods on Lipschitzian Problems in Hilbert Space
CMA-R46-85	Alan McIntosh and Alan Pryde	A functional calculus for several commuting operators
CMA-R47-85	D.J. Cullen	Stable System Equivalence
CMA-R48-85	D.J. Cullen	A Module Theoretic Characterization of Decoupling Zeros
CMA-R49-85	D.J. Cullen	A Categorical Characterisation of Irreducibility
CMA-R50-85	Nick Korevaar and Gary Lieberman	Gradient Estimates for the Capillary Problem via the Maximum Principle
CMA-R51-85	Gerhard Huisken	Deforming Hypersurfaces of the Sphere by their Mean Curvature

PUBLICATIONS, 1985

(iv)

1. ANDERSSSEN, R.S. and F.R.de HOOG, Finite Difference Methods for the Numerical Differentiation of Non-exact Data, *Computing* 33 (1984) 259-267.
2. ANDERSSSEN, R.S. (with D.R. Jackett), Use of the linear functional strategy for assessing the status of plant canopies, in *Industrial Numerical Analysis* (eds. C.M. Elliott and S. McKee, Oxford University Press, Oxford, 1985).
3. ANDERSSSEN, R.S. (with D.R. Jackett, D.L.B. Jupp and J.M. Norman), Interpretation of and simple formulas for some key linear functionals of the foliage angle distribution, *Agric. Forest Meteor.* 36 (1985).
4. ANDERSSSEN, R.S. (with C. Wang and K.J. Muirhead), Observation of core phases from Australian short-period array seismograms, *Bull. Inst. Earth Sci., Academia Sinica, Taipei*, (1985).
5. BARTNIK, R., Existence of maximal surfaces in asymptotically flat spacetimes, *Comm. Math. Physics* 94 (1984) 155-175.
6. BOJANCZYK, A., Optimal Asynchronous Newton Method for the Solution of Nonlinear Equations, *J. of Assoc. for Computing Machinery* 31 (1984) 792-803.
7. BRENT, R.P., The most-recently-used strategy for dynamic storage allocation on a computer with virtual memory, *Proceedings of the Eighth Australian Computer Science Conference*, special issue of *Australian Computer Science* 7 (1985) 17.1-17.8.
8. BRENT, R.P. (with H.T. Kung), A systolic VLSI array for integer GCD computation, in *ARITH-7* (Proceedings of the Seventh Symposium on Computer Arithmetic, edited by K. Hwang), IEEE/CS Press, New York, 1985, 8pp.
9. BRENT, R.P. (with F.T. Luk), The solution of singular-value and symmetric eigenvalue problems on multiprocessor arrays, *SIAM J. Scientific and Statistical Computing* 6 (1985) 69-84.
10. BRENT, R.P. (with F.T. Luk and C.F. Van Loan), Computation of the singular value decomposition using mesh-connected processors, *J. of VLSI and Computer Systems* 1, 3 (1983-1985) 242-270.
11. CULLEN, D.J. (with B.D.O. Anderson and W.A. Coppel), Strong System Equivalence (I), *J. Austral. Math. Soc. Ser. B.* 27 (1985) 194-222.
12. CULLEN, D.J. (with W.A. Coppel), Strong System Equivalence (II), *J. Austral. Math. Soc. Ser. B.* 27 (1985) 223-237.
13. CULLEN, D.J., The Equivalence of Linear Systems, *Bull. Austral. Math. Soc.* 32 (1985) 317-319.
14. DE HOOG, F.R. (with D.R. Jackett), On the Rate of Convergence of Finite Difference Schemes on Non-Uniform Grids, *J. Austral. Math. Soc. Ser. B.* 26 (1985) 247-256.

15. DE HOOG, F.R. and MATTHEIJ, R., The Role of Conditioning in Shooting Techniques, in *Numerical Boundary Value ODE's* (Birkhauser, 1985) 21-54.
16. DE HOOG, F.R. (with R. Weiss), The Application of Runge-Kutta Schemes to Singular Initial Value Problems, *Math. Comp.* 44 (1985) 93-103.
17. * FABES, E.B., Boundary value problems of linear elastostatics and hydrostatics on Lipschitz domains, *Proc. Centre for Math. An., Aust. Nat. Univ.* 9 (1985) 27-45.
18. * GIUSTI, E. (with Giaquinta M.), Boundary $C^{1,\alpha}$ Regularity for Second-Order Elliptic Equations in Divergence Form, *J. für die reine und angewandte Mathematik* 351 (1984) 55-65.
19. * GUSTAFSON, S-A., On the Stability of a Class of Convergence Acceleration Methods for Power Series, *BIT* 24 (1984) 510-519.
20. HUISKEN, G., Capillary Surfaces over Obstacles, *Pacific J. Math.* 117 (1985) 121-141.
21. HUTCHINSON, J. (With N. Fusco), $C^{1,\alpha}$ Partial Regularity of Functions Minimising Quasiconvex Integrals, *Manuscripta Mathematica* 54 (1985) 121-143.
22. HUTCHINSON, J., $C^{1,\alpha}$ Multiple Function Regularity and Tangent Cone Behaviour for Varifolds with Second Fundamental Form in L^p , *Symposia in Mathematics* (1985).
23. * IKEDA, N. (with I. Shigekawa and S. Taniguchi), The Malliavin calculus and long time asymptotics of certain Wiener integrals, *Proc. Centre for Math. An., Aust. Nat. Univ.* 9 (1985) 46-113.
24. JEFFERIES, B., Conditional expectation for operator-valued measures and functions, *Bull. Austral. Math. Soc.* 30 (1984) 421-430.
25. JEFFERIES, B., Radon Polynomials, *Bull. Austral. Math. Soc.* 32(1985) 207-216.
26. KENNINGTON, A.U., Power Concavity and Boundary value problems, *Indiana University Mathematics Journal* 34 (1985) 687-704.
27. * KRBEC, M., On Anisotropic Imbeddings, *Comm. Math. Univ. Carolina* 75 (1984) 473-481.
28. McLEAN, W., Error estimates for a first kind integral equation and an associated boundary value problem, *Proc. Centre for Math. An., Aust. Nat. Univ.* 9 (1985) 223-240.
29. * McINTOSH, A. (with A. Pryde), The solution of systems of operator equations using Clifford algebras, *Proc. Centre for Math. An., Aust. Nat. Univ.* 9 (1985) 212-222.

30. * MCINTOSH, A., Square Roots of Elliptic Operators, *J. Functional Analysis* 61 (1985) 307-327.
31. MARKOWICH, P.A., *The Stationary Semiconductor Device Equations* (Springer-Verlag, Wien, 1985) 131-177.
32. MATTHEIJ, R. and DE HOOG, F.R., On Non-Invertible Boundary Value Problems, in *Numerical Boundary Value ODE's* (Birkhauser, 1985) 55-76.
33. NEWSAM, G.N. (with R. Barakat), Algorithms for reconstruction of partially known, bandlimited Fourier transform pairs - I. The prototypical linear problem, *J. Integral Eq.* 9 (1985) (Suppl.) 49-76.
34. NEWSAM, G.N. (with R. Barakat), Algorithms for reconstruction of partially known, bandlimited Fourier transform pairs - II. The nonlinear problem of phase retrieval, *J. Integral Eq.* 9 (1985) (Suppl.) 77-125.
35. NEWSAM, G.N. (with R. Barakat), Algorithms for reconstruction of partially known, bandlimited Fourier transform pairs from noisy data, *J. Opt. Soc. Am. A* 2 (1985) 2027-2039.
36. NEWSAM, G.N. (with R. Barakat), Essential dimension as a well defined number of degrees of freedom of finite- convolution operators appearing in optics, *J. Opt. Soc. Am. A* 2 (1985) 2040-2045.
37. * SIMON, B. (with E.B. Davies), Ultracontractivity and the HeatKernel for Schrodinger Operators and Dirichlet Laplacians, *J. of Functional Analysis* 59 (1984) 335-395.
38. SIMON, L. (with R. Hardt), Area minimizing hypersurfaces with isolated singularities, *Journal fur die Reine und Angewandte Mathematik* (Crelle's Journal) 362 (1985) 1-29.
39. SIMON, L., Recent developments in the theory of minimal surfaces, *Proceedings of the International Congress of Mathematicians* (North Holland 1984) 579-584.
40. SIMON, L. (with L. Caffarelli and R. Hardt), Minimal surfaces with isolated singularities, *Manuscripta Mathematica* 48 (1984) 1-18.
41. * STEIN, E.M., Radon singular integrals, *Proc. Centre for Math. An., Aust. Nat. Univ.* 9 (1985) 114-119.
42. * TRIEBEL, H., Traces of anisotropic function spaces. Applications., *Proc. Centre for Math. An., Aust. Nat. Univ.* 9 (1985) 120-131.
43. TRUDINGER, N.S., Regularity of Solutions of Fully Nonlinear Elliptic Equations, *Bollettino U.M.I.* (6) 3-A (1984) 421-430.

44. TRUDINGER, N.S., Graphs with Prescribed Curvature, in *Proc. Symposia in Pure Mathematics, Nonlinear Functional Analysis*, (Amer. Math. Soc., 1985).
45. TRUDINGER, N.S., On an interpolation inequality and its applications to nonlinear elliptic equations, *Proc. Amer. Math. Soc.* 95 (1985) 73-78.
46. URBAS, J., The Equation of Prescribed Gauss Curvature without Boundary Conditions, *J. Diff. Geom.* 20 (1984) 311-327.
47. WILLIAMS, G., The Dirichlet problem for the Minimal Surface equation with Lipschitz Continuous Boundary Data, *J. für die reine und angewandte Mathematik* 354 (1984) 123-140

* Former member