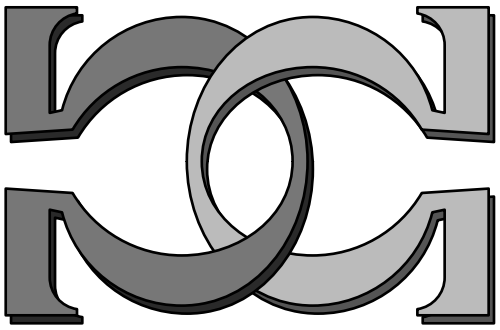

Centre for Discrete Mathematics and Theoretical Computer Science
Computer Science Department, The University of Auckland
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http://www.cs.auckland.ac.nz/CDMTCS/

CDMTCS: 2001 ANNUAL REPORT

The Centre for Discrete Mathematics and Theoretical Computer Science was founded in 1995 in order to a) support basic research on the interface between mathematics and computing, b) increase local knowledge in these areas, and c) broaden research skills in New Zealand.
The aim of the Management Committee to build one of the world's best centres for research in Discrete Mathematics and Theoretical Computer Science is coming true. The Centre has become a major force in fostering research and development in those areas within the South Pacific Region and creating productive links between that region's researchers and their counterparts in the rest of the world.

Although the Centre encourages and supports a wide range of research activity, its primary research foci are the following

- Artificial Intelligence
- Combinatorial Optimisation
- Computability and Complexity
- Constructive Algorithmics
- Quantum and Molecular Computation

The Centre is supported financially by the Departments of Computer Science and Mathematics and sponsored by *Pukekohe Travel*.

The major activity of the Centre in 2001 was the organisation of the Third International Conference "Discrete Mathematics and Theoretical Computer Science" (DMTCS'2001), dedicated to Professor Frank Harary on the occasion of his 80th Birthday. The Conference took place from July 2 to July 6 at the Faculty of Mathematics and Computer Science of the "OVIDIUS" University Constanţa; it was organized jointly by the CDMTCS and the "OVIDIUS" University Constanţa, Romania, with the co-operation of the Maritime Academy "Mircea cel Batran", Constanţa, Romania. The volume containing invited papers and regular contributions has appeared as C. S. Calude, M. J. Dinneen, S. Sburlan (eds.). *Combinatorics, Computability and Logic, Proceedings of DMTCS'01*, Springer-Verlag, London, 2001, 250 pp. The web-site of the Conference is `http://www.cs.auckland.ac.nz/CDMTCS/conferences/dmtcs01/`

Director

Professor C.S. Calude (Auckland)

Deputy Director

Dr. Michael J. Dinneen

Research Reports Coordinator

Dr. Michael J. Dinneen

Management Committee

The activities of the Centre are overseen by a Management Committee consisting of

- Professor Douglas Bridges (External Researchers Representative, Canterbury University),
- Professor Cristian Calude (Director),
- Dr. Michael J. Dinneen (Deputy Director),
- Professor David Gauld (HOD Mathematics Department),
- Professor John Hosking (HOD, Computer Science).

Participating Members

The Centre includes the following faculty members:

> C. P. Bonnington (Mathematics, Auckland), D. S. Bridges (Mathematics, Canterbury), C. Calude (Computer Science, Auckland), M. D. E. Conder (Mathematics, Auckland), M. J. Dinneen (Computer Science, Auckland), R. W. Doran (Computer Science, Auckland), P. Gibbons (Computer Science, Auckland), U. Guether (Computer Science, Tamaki), H. Guesgen (Computer Science, Auckland), P. R. Hafner (Mathematics, Auckland), F. Kroon (Philosophy, Auckland) B. Khoussainov (Computer Science, Auckland), R. Nicolescu (Computer Science, Tamaki), E. O'Brien (Mathematics, Auckland), B. Pavlov (Mathematics, Auckland), I. Reilly (Mathematics, Auckland), M. Titchener (Computer Science, Tamaki), C. Thomborson (Computer Science, Auckland), M.C. Wilson (Computer Science and Mathematics, Auckland).

International Advisory Board

The Centre has a International Advisory Board consisting of the following members:

> M.A. Arslanov (Kazan State University, Russia), R.C. Backhouse (Eindhoven University of Technology, Netherlands), J. Casti (Santa Fé Institute, New Mexico, US, and Technische Universität, Vienna, Austria), G.J. Chaitin (IBM, New York, US), C.J. Colbourn (University of Vermont, US), E.W. Dijkstra (University of Texas, Austin, US), J.H. Dinitz (University of Vermont, US), J.A. Goguen (University of California at San Diego, US), R.L. Graham (University of California at San Diego, US), J. Hartmanis (Cornell University, US), H. Jürgensen (University of Western Ontario, Canada and Potsdam University, Germany), C.C. Lindner (Auburn University, Alabama, US), R. Mathon (University of Toronto, Canada), B.D. Mackay (Australian National University, Australia), A. Nerode (Cornell University, US), I. Prigogine (Solvay Institute, Belgium), G. Rozenberg (Leiden University, Netherlands), A. Salomaa (University of Turku, Finland), J. Seberry (University of Wollongong, Australia), D van Dalen (University of Utrecht, Netherlands).

External Researchers

The *External Researchers* had a great contribution to the Centre's activities by refereeing papers, assisting with conference and workshop organisation, and by other means. The current External Researchers are

> I. Antoniou (Solvay Institute, Belgium), E. Calude (Massey University at Albany, New Zealand), R. Downey (Victoria University of Wellington, New Zealand), B. Everitt (University of Aberdeen, Scotland), R. Goldblatt (Victoria University of Wellington, New Zealand), P. Hertling (FernUniversität Hagen, Germany), D. Holton (University of Otago, New Zealand), K.-W. Lih (Institute of Mathematics, Academia Sinica, Taiwan), C. Little (Massey University, New Zealand), M. Lipponen (Turku University, Finland), J. McKay (Concordia University, Canada), Gh. Păun (Institute of Mathematics, Romanian Academy, Romania), C.E. Praeger (University of Western Australia), L. Staiger, Martin-Luther-Universität Halle-Wittenberg, Germany, K. Svozil (Technische Universität, Vienna), D. Ştefănescu (Bucharest University, Romania), S. Yu (University of Western Ontario, Canada), I Tomescu (Bucharest University, Ontario).

Graduate Students

The following graduate students are working in close connection with the research program of the Centre:

1. Joshua Arulanandham, Natural Algorithms [PhD]
2. Zili Deng, Applied Tree Automata for Bounded Treewidth Graphs [Masters; completed March 2001]
3. Fang Guo, Branch-and-Bound Algorithms for the Broadcast Problem [Masters; completed March 2001]
4. Cristian Grozea, Non-Binary Codings [Phd]
5. Jeong Seon Koo, A Decision Support System for Air Pollution Health Risk Analysis [PhD]
6. Andrew Luxton, Cognitive Maps for Exploration [PhD]
7. Sikimeti Mau, Directed Graph Embeddings [Masters]
8. Zhou (Joe) Peng, Graph Embeddings and Drawings of Graphs of Bounded Treewidth [Masters; completed March 2001]
9. Sasha Rubin, Finite Automata and Algebraic Structures [Phd]
10. Chi-Kou Shu, Computing Exact Approximations of a Chaitin Omega Number [Phd]
11. Jamie Sneddon, Structural Graph Theory [PhD]
12. Sanja Todorovic Vasiljevic, Bounds on the Number of Automorphisms of a Compact Non-Orientable Surface of Given Genus [PhD; completed December 2001]
13. Anna Torstensson, Smallest Index Common Subgroups of Commensurable Bianchi Groups and Tetrahedral Groups [Masters]
14. Shona Yu, One-relator Quotients of the Modular Group [Masters]
15. Fingee Wu, A Framework for Memetic Algorithms [Masters; completed October 2001]
16. Alfred (Nian) Zhu, Directed Broadcast Networks [Masters]
17. Biao Yang [Masters, starting]
18. Graduate Reading Courses supervised in Combinatorics: Andreea Calude, Rula Jihad, Sikimeti Mau, Caroline Yoon.

Visitors

The Centre hosted the following visitors:

- Prof. Rod Downey , Victoria University of Wellington, NZ
- Prof. Karl Svozil, Technical University of Vienna, Austria
- Prof. Larry Carter, UCSD, USA
- Prof. Jeanne Ferrante, UCSD, USA
- Prof, Sergey Goncharov, Institute of Mathematics, Novosibirsk, Russia
- Prof. Manfred Meyer, Univ. of Applied Sciences Schmalkalden, Germany
- Prof. Hermann Maurer, Technical University of Graz, Austria
- Dr. Primoz Potocnik, University of Ljubljana, Yugoslavia
- Dr. Colin Maclachlan, University of Aberdeen, UK
- Prof. Steve Wilson, Northern Arizona University, USA
- Dr. George Havas, University of Queensland, Australia
- Prof. Mike Newman, Australian National University, Australia
- Prof. Cheryl Praeger, University of Western Australia, Australia
- Prof. John Cannon, University of Sydney, Australia
- Prof. Michael Thielscher, Dresden University of Technology Dresden, Germany
- Prof. J. Casti, Santa Fe Institute, USA (AU Found. Visitor)
- Prof. M. Deza, Ecole Normale Superieure, Paris, France
- Prof. T. Kieu, SWT, Melbourne, Australia
- Dr. L. Vâţă, Christchurch University, NZ
- Prof. T. Asano, JAIST, Japan

Research Grants

1. Paul Bonnington, M. Morton, Dr R. Aldred, Marsden Fund Grant continued,
2. Marston Conder, Jianbei An & Eamonn O'Brien Marsden Fund Grant, continued.
3. Michael Dinneen, Marsden Fund Grant, continued.
4. Bakh Koussainov, Marsden Fund Grant, continued.
5. Vaughan Jones, Marston Conder, Rod Downey, David Gauld, Gaven Martin, Marsden Fund Grant, continued.

Workshops/Conferences Organised by the Centre

- Third International Conference organised by the CDMTCS "Discrete Mathematics and Theoretical Computer Science" (DMTCS'2001), in co-operation with the "OVIDIUS" University Constanţa, 2–6 July 6, Constanţa, Romania.
- "Workshop on Truths and Proofs", organised by the CDMTCS in conjunction with the Annual Conference of the Australasian Association of Philosophy (New Zealand Division), Auckland University, December 2001.

Workshops/Conferences Organised by Members of the CDMTCS

- C.S. Calude: co-organiser of *Workshop on Truths and Proofs*.
- Marston Conder: co-organiser of *NZMRI Meeting on Algorithms & Complexity*.
- Michael Dinneen: secretary for *DMTCS'01*.
- Hans Guesgen: co-chair of the *Special Track on Spatio-Temporal Reasoning at FLAIRS-01*, co-chair of the *IJCAI-01 Workshop on Spatial and Temporal Reasoning with 'Agents' Focus* and NZQA Advisory Group Member for the Information Technology Training Institute (ITTI), Auckland.

Programme Committee

- C. Calude: *DLT'02*, Kyoto, Japan, *TSCI2001*, Orlando, USA, *WMC-CdeA 2001*, Curtea de Argeş, Romania, *FCT'2001*, Riga, Latvia, *DCAGRS 2001*, Vienna, Austria.
- Hans Guesgen: *IEA/AIE-01*.

Invited Talks

- Paul Bonnington: invited address at the *International Conference on Graph Embeddings*, Bratislava, Slovakia, July 2001.
- D.S. Bridges: invited talks at *New Zealand Mathematics Colloquium*, Palmerston North, and *"Truths and Proofs"*, Auckland.
- C.S. Calude: invited talks at the *Second Pacific Rim Conference on Mathematics*, Taipei, and *DLT'01*, Vienna.
- Marston Conder: invited lectures at Trento, July 2001 and Oxford, August 2001.
- Bakh Khoussainov: invited talk at the *International Conference in Computability Theory*, September, 2001, Novosibirsk.

Affiliations

- Logic Group at JAIST,
- Mindship International,
- Turku Centre for Computer Science (TUCS).

Publications and Technical Reports

The CDMTCS is editing Springer-Verlag Books Series *Discrete Mathematics and Theoretical Computer Science* and cooperates with Graz University of Technology and Turku University in editing Springer-Verlag *Journal of Universal Computer Science*. Members of the CDMTCS are members of the editorial boards of the following journals: *N.Z. Journal of Mathematics, International Journal of Applied Intelligence, Pattern Analysis and Applications Journal, Australasian Journal of Combinatorics, Philosophia Mathematica, Analele Universităţii Bucureşti, Matematică-Informatică, Journal of Computing and Information, Grammars, Fundamenta Informaticae, Romanian Journal of Information Science and Technology.* Special Issues of the *International Journal on Applied Intelligence, Journal of Universal Computer Science* have been edited.

DMTCS Book Series with Springer

1. S. Rudeanu. *Lattice Functions and Equations.*
2. C. Teuscher. *Turing's Connectionism. An Investigation of Neural Network Architectures.*
3. T. Helleseth, P.V. Norway Kumar, K. Yang, (eds.). *Sequences and their Applications, Proceedings of SETA'01.*

Research Papers

More than 150 research papers have been published by faculty members and graduate students.

CDMTCS Research Reports

148 R.G. Downey, D.R. Hirschfeldt and G. LaForte Randomness and Reducibility. 01/2001

149 U. Guenther T-Complexity and T-Information Theory – an Executive Summary. 02/2001

150 C.S. Calude and M. Dumitrescu Entropic Measures, Markov Information Sources and Complexity. 02/2001

151 H.L. Bodlaender, M.J. Dinneen and B. Khoussainov On Game-Theoretic Models of Networks. 04/2001

152 C.S. Calude, M.J. Dinneen and S. Sburlan (editors) Supplemental Abstracts for DMTCS01. 04/2001

153 U. Guenther Matching T-Codes to a Source. 04/2001

154 S. Filipp and K. Svozil Boole-Bell-type Inequalities in Mathematica. 05/2001

155 N. Donath and K. Svozil Finding a State in a Haystack. 05/2001

156 C.S. Calude and B. Pavlov Coins, Quantum Measurements, and Turing's Barrier: Preliminary Version. 06/2001

157 S.Y.P. Lee and M.J. Dinneen A Conference Submission Web Server. 06/2001

158 C. Grozea Relations Between the Low Subrecursion Classes. 07/2001

159 D. Bridges and L.S. Vita A Constructive Theory of Point-Set Nearness. 08/2001

160 F.W. Meyerstein and A.P. Moller LifeTime: A Unified Study of Life (A Preliminary Version). 09/2001

161 C.S. Calude and E. Calude The Bridge Crossing Problem: Draft Form. 09/2001

162 D.R. Hirschfeldt, B. Khoussainov, R.A. Shore and A.M. Slinko Degree Spectra and Computable Dimensions in Algebraic Structures. 10/2001

163 B. Khoussainov Algebraic Constraints, Automata, and Regular Languages (Revised). 11/2001

164 R.G. Downey, D.R. Hirschfeldt and B. Khoussainov Uniformity in Computable Structure Theory. 11/2001

165 D.S. Bridges, C.S. Calude and F. Kroon (editors) Workshop on Truths and Proofs. 11/2001

166 C.S. Calude Incompleteness, Complexity, Randomness and Beyond. 11/2001

167 C.S. Calude, M.J. Dinneen and C.-K. Shu Computing a Glimpse of Randomness. 12/2001

168 M. Deza, M. Dutour and E. Panteleev Small Cones of Oriented Semi-Metrics. 12/2001

169 M. Dutour and M. Deza The Hypermetric Cone on Seven Vertices. 12/2001

170 C.S. Calude and B. Pavlov Coins, Quantum Measurements, and Turing's Barrier.

Honours

1. Marston Conder appointed to Marsden Fund Council by Minister of RS&T, December 2001.

Professor Cristian S. Calude

Centre for Discrete Mathematics and Theoretical Computer Science

Financial Statement for 2000

Income		
	Carry on from 2000	$ 16,060.00
	Auckland, Computer Science Department	$ 20,000.00
	Auckland Mathematics Department	$ 6,000.00
	UMC'2K Conference	$ 4,975.06
	DMTC'01	2,724.27
	AU Foundation (Prof. Casti)	$ 2,000.00
	Auckland Philosophy Department (Prof. Casti)	$ 500.00
	Total income:	$ 51,903.83
Expenditure		
	Subscription	$ 259.60
	Communication	$ 751.90
	Travel and accommodation (including visitors/invited speakers)	$ 18,873.83
	UMC'2K, ATMGT2K, DMTCS'01, "Truths & Proofs", sundry expenses	$ 20,293.19
	Books, equipment, other	$ 3,042.85
	Total expenditure	$ 43,221.37
Carry on 2002		**$ 8,682.46**