CHASE REPORT

NEWSLETTER OF THE DEPARTMENT OF MATHEMATICS AND STATISTICS

DALHOUSIE UNIVERSITY, HALIFAX, N.S.

MAY 2000

EDITOR'S NOTE

Lots has happened in the department since our last Newsletter. It is not easy to keep up with everything that is going on, but I have tried to do my best. I hope this grabs your interest and gives you enjoyable reading. This year we will distribute this newsletter via mail but also via e-mail and our Web page! Some of us "old timers" were talking about our past graduates and are wondering "Where Are They Now and What Are They Doing". In connection with this, please drop me a note with your information. Who knows, this could become an interesting column in future newsletters. Also, if you have any contributions/news you would like to share, please send it along. It's always nice to hear from you, and don't forget, drop by the department if you are ever in Halifax. We would love to see you again.

Gretchen Smith,
Administrator
Tel: 902-494-2572
Fax: 902-494-5130
gretchen@mscs.dal.ca

CONGRATULATIONS TO OUR AWARD WINNERS

APICS Certificate for outstanding performances in the APICS Math Competition

Ian Caines and Jacky Li

Katherine M. Buttenshaw Prize

Alice McLeod and Matt Carroll

Sir William Young Gold Medal (Mathematics)

Ian Caines

Bernoulli Prize

Jean-Claude Saulnier

Ralph and Frances Lewis Jeffery Scholarship

Ian Caines

Ellen MacCaughin McFarlane Prize

James Michael

Waverly Prize

Chris Dabrowski

Barry Ward Fawcett Memorial Scholarship

Piotr Lichodzijewski

Emil and Stella Blum Scholarship

Piotr Lichodzijewski

Ken Dunn Memorial Prize

Jenna Robbins

NSERC POSTGRADUATE SCHOLARSHIP WINNERS

Congratulations to the following students who received NSERC POSTGRADUATE Scholarships.

PGS A:

- Ian Caines
- Alice McLeod

PGS B:

- Nancy Clarke
- Connie Winchester

WELCOME TO OUR SUMMER RESEARCH STUDENTS

The following will be Summer NSERC research students in the department.

- Chris Dabrowski will be working with Professor Jason Brown on Fractals.
- *Paul Sheridan* will be working with Professor Karl Dilcher on Number Theory.
- *James Michael* will working with Professor Heydar Radjavi on Operator Theory.
- *Shoan Kale* will be working with Professor John Clements on Collision Avoidance Strategies in Air Traffic Management.
- *Adam Clay* will be working with Professor Rob Milson on A Computerized Homework System for Linear Algebra.

In addition, *Jacky Li* will spend the summer on a research project on Differential Geometry of Curves with Professor John Clements.

DEPARTMENT NEWS

I was asked to write a paragraph or two for our newsletter about what I have been up to during the past year, and told it should be interesting and amusing. Okay, of course I have been doing the usual things, including advising students, conducting a seminar, and entertaining mathematical guests at Dalhousie and doing research with them. Now a couple of stories I found amusing.

One is related to my book with Peter Rosenthal, which just came out under the almost unpronounceable title of "Simultaneous Triangularization". Peter Rosenthal, who is a lawyer in addition to being a mathematician, was recently interviewed by the CBC radio, which was interested in his double life. The interviewer obviously knew much more about his court cases than his mathematics and asked him whether he is as active in mathematics as he is in law. "Yes," said he, "as a matter of fact a colleague and I have a book coming out soon." The interviewer asked about the title and did his best to pronounce it. That night Peter received a call at home from a grandmother who congratulated him on the interview and said, "by the way, what was the name of that book again? My little granddaughter is doing well in school mathematics and I'd like to give her a copy on her birthday." She was of course persuaded not to, but we didn't tell the publishers.

The second story concerns my visit to Slovenia last May, where we were conducting a workshop in operator-theoretic algebra for ten days. Everyday, at lunch time, we took a six-kilometre walk around the truly beautiful lake Bled next to the conference site. One of the days we stopped to watch a duck swimming with what seemed to be an unusually large number of offspring following her. Some of us counted the ducklings and, since they were so close together, we came up with different sums 11, 12, and 13. An old couple, English tourists apparently, were also watching the ducks and overhearing us. The man smiled at us and said, "mathematics isn't one of your strong points, is it?" "But we are mathematicians," I protested, "in fact, we are attending a Math conference here." They both smiled again, obviously knowingly, and he said, "it figures."

Heydar Radjavi

GRADUATE STUDENT SOCIETY

Everyone in the math department has begun to look forward to Friday mornings&#65533;and not for the usual reasons! From 10-11am the Graduate Students Society holds a Friday coffee hour in the faculty lounge. It provides an opportunity to take a break from mathematical and statistical endeavours and enjoy some much needed human contact. This year, in addition to instituting the coffee hour (a practice that is sure to become a tradition), the grad students held a Valentine's day pizza party where Shigui Ruan won the free movie passes (it pays to attend!). There are plans in the works for an end of term barbeque. Suggestions for events are always welcome. The society can be reached at the following e-mail address: msgrads.mscs.dal.ca

NEWS FROM ALUMNI

Darin Fraser (M.Sc. 87) is working as an actuarial analyst for Manitoba Public Insurance Corporation which is a Crown Corporation.

Jim Creighton, is moving to Deutsche Bank AG from Barclays Global Investors. Jim will be head of global index management at Deutsche Asset Management's Americas unit in New York, which oversees about $300-billion (US) in assets. He was global chief investment officer at San Francisco based Barclays Global a unit of the British bank.

MEETINGS - COMPETITIONS

- **International Category Theory Meeting, CT 99**

  The International Category Theory Meeting, CT99, was held at the University of Coimbra, Portugal summer (1999) and attended by Dalhousie Professors, Par&#65533;, Wood, adjunct professors Dawson and Rosebrugh (all of whom gave talks) and students Ian Caines, Dale Garraway and Mitja Mastnak. Also at the

meeting of departmental note were Francisco Marmolejo, a Dalhousie PhD graduate now at UNAM who visited us last summer, Moneesha Mehta, a recent MSc. graduate who has been studying in Utrecht, and Claudia Centazzo, then of Trieste who has recently joined us as an Atlantis exchange student. Many of the international participants were people who were at Dalhousie in the early 1970's.

- **APICS Mathematics Competition - October 1999**

  The APICS Mathematics Competition, which was held in October in St. John's, Newfoundland, was won by the Dalhousie team consisting of Ian Caines and Jacky Li. This was the second consecutive win for Dalhousie; Ian Caines was on both winning teams.

- **Putnam Competition - 1999**

  In the 1999 Putnam Competition the Dalhousie team, consisting of Ian Caines, Jacky Li and Alice McLeod, ranked in the top 20% among the 346 teams who participated from across the US and Canada.

Math Camp for Black Students

This will be the 10th Math Camp for Black Students organized by Dalhousie University's Math and Stats Department in cooperation with the Black Educators Association of Nova Scotia. About forty students from grade 6, 7 and 8 at various schools in Nova Scotia are brought to Dalhousie for a week. This year the camp will be held in July. Morning sessions are devoted to the learning of Mathematics and especially developing the mathematical thinking of the students. Afternoons are devoted to outdoor activities which enhance their thinking and interest in applying mathematical tools to various situations. The evenings are left for cultural activities. The camp generates interest and enjoyment of mathematical ideas; it explores mathematical concepts and strategies which are useful to campers in their future and it develops confidence in their mathematical skills.

The camp has been very successful. A number of campers have already graduated from various universities in Nova Scotia and have gone on to do

graduate work in other parts of Canada. The first camp in 1991 was organized by Dr. C.C.A. Sastri of this department.

Canadian Math Society and Esso Math Camp

The department plans to hold a summer math camp, sponsored by the Canadian Mathematical Society (CMS) and Esso, in the week of July 17th. Its aim is to identify, stimulate, and encourage mathematical talent among high school students in Nova Scotia and perhaps other parts of Atlantic Canada, depending on resources. The camp will consist of lectures by Faculty from Dalhousie as well as some of our sister universities and problem sessions and will include extracurricular activities. It should be fun. We are looking forward to it!

Math APPOINTMENTS, CROSS-APPOINTMENTS

Dr. John C. Clements and *Dr. Shigui Ruan* have been cross-appointed as members of the graduate faculty for the School of Biomedical Engineering.

The department will get another Killam Postdoctoral Fellow: *Dr. J rg Richstein*, a computational number theorist from the University of Giessen in Germany, was recently offered, and has accepted, the fellowship. He will be joining the department in September.

Dr. Dorette Pronk, presently at Calvin College in Grand Rapids, Michigan received a University Faculty Award, along with an NSERC research grant. There were only 23 such awards across Canada this year and only 3 of them were won by mathematicians. Dr. Pronk will be taking up her award in the Mathematics and Statistics Department, Dalhousie University

Professor Guy Bernard and *Professor Patrick J. Farrell* of Acadia University have been appointed Adjunct Professors.

STUDENT NEWS

We presently have 26 graduate students. Of these, 14 are working on their Ph.D. degrees and 12 on their Masters.

In October we had 7 students graduate with their Masters Degrees and one with a Ph.D Congratulations to the following students

- *Nancy Clarke* (M.Sc. - Mathematics)
- *Stephen Finbow* (M.Sc. - Mathematics)
- *Amy Hynick* (M.Sc. - Mathematics)
- *Annik Martin* (M.Sc. - Mathematics)
- *Mitja Mastnak* (M.Sc. - Mathematics)
- *Rong Wang* (M.Sc. - Mathematics)
- *Changchun Xie* (M.Sc. - Statistics)

  And

- *J. Concepcion Loredo-Osti* (Ph.D. - Statistics)

Claudia Centazzo has been an exchange student with us, from the University of Trieste. Claudia is working on her Masters degree and will graduate this coming October. She is working with Professor Wood.

We have had two exchange students from Le Pole Universite Leonard de Vinci, Paris France this term. *Anne-Laure Michel* and *Dorine Torchin* are mechanical engineering students and are both taking fourth year mathematics classes in differential equations and non-linear programming.

FACULTY NEWS

Jeannette Janssen was an invited speaker at the 13th Midwestern conference on Cryptography and Computing.

The Mathematics Division was awarded a $29,000 NSERC equipment grant, for the purchase and upgrade of computing equipment.

Richard J. Nowakowski is on a 6-month sabbatical which he is spending in New Zealand and Australia. *Richard J. Wood* is Acting Chair in his absence.

Milan Horacek (Physiology and Biophysics*), John Clements* (Mathematics & Statistics) and Martin Gardner (Cardiology) were awarded a Medical Research Council of Canada grant of $212,472 for the period 2000-2003. The objective of the research supported by this grant is to validate our existing anatomically accurate computational model of the human heart and through model simulations, to gain (a) better insight into the mechanisms of VT(ventricular tachyarrhythmias), and (b) the ability to predict the outcome of therapeutic interventions (including catheter ablation and the use of antiarrhythmic drugs) in VT patients. An additional objective will be the development of a clinical procedure for guiding, in real-time, catheter-ablation therapy of VT patients.

John Clements and Milan Horacek have also received an NSERC Collaborative Health Research Project grant of $149,607 for the period 2000-2003. This grant is to support work on the extension of the present heart model to incorporate a complete conduction system with Purkinje cells and Purkinje-muscle junctions (PMJs) as well as comprehensive cell-membrane dynamics defined by systems of coupled differential equations and to improve the mathematical simulation of propagated activation by including detailed volume-conductor models for the extracardiac thoracic tissues. An important tool in these studies will be the new IBM Scalable Parallel SP2 computer system recently acquired by Dalhousie.

Tony Thompson gave a talk at the AMS regional meeting in Lowell, Massachusetts, April 1-2. Robert Dawson (Adjunct Professor) and Eric Demaine (recent graduate of Dal) also gave talks at the same meeting.

Through an Industrial Research Contract *with John Clements*, Dr. Paul Hines of the Environmental Acoustics Group at The Defence Research Establishment Atlantic was able to provide the department with $18,000 in graduate student support. Our thanks for his efforts on our behalf.

Dr. Wei-Jiu Liu, our Killam PDF has been very busy attending conferences and publishing research in his area. Dr. Liu joined our department in August, 1999. He gave talks at

- the APICS conference "Trends in Differential Equations and Dynamical Systems" held at Memorial University of Newfoundland, Oct 22-24, 1999;
- the 38th IEEE conference on Decision and Control held at Phoenix, AZ, USA, Dec 7-10, 1999;
- and at the Department of Applied Math, University of Waterloo, April 1-4, 2000.

- He has had 6 papers accepted.

SEMINARS/COLLOQUIA

Mathematics and Statistics - Colloquia 1999/2000

DATE, TITLE AND SPEAKER

- 05.07.1999 - On arithmetic functions and functional equations. L.G. Lucht, Technical University of Clausthal, Germany
- 20.07.1999 - Joinings of measure preserving dynamical systems. Reem Yassawi, Trent University
- 04.08.1999 - What are orbifolds ? Dorette Pronk, College
- 03.09.1999 - Artin L-functions. Yuanli Zhang, Purdue University
- 27.09.1999 - A survey of Ishikawa iteration procedures with errors. Zhenyu Huang, Nanjing University
- 04.10.1999 - Infinite words and sequences. Srecko Brlek, University of Quebec at Montreal
- 08.10.1999 - Getting computer algebra systems to integrate properly. David Jeffery, University of Western Ontario
- 18.10.1999 - Dissipation and Attractors. J.K. Hale, Georgia Institute of Technology
- 25.10.1999 - The development of operator K-theory. Fillmore, Dalhousie University
- 28.10.1999 - The inductive limit of a Bratteli diagram. George Elliot, The Fields Institute, University of Toronto
- 08.11.1999 - Totally positive operators. Matjaz Omladic, University of Ljubljana, Slovenia
- 15.11.1999 - Variation of eigenvalues. Thomas Ransford, Universite Laval, Quebec City
- 13.01.2000 - Abstract approximation spaces of type-free sets. Peter Apostoli, University of Toronto
- 17.01.2000 - Mathematical and computer modelling of the electrical activity of the heart. Josh Leon, Ecole Polytechnique, University of Montreal
- 31.01.2000 - Not-so-random thoughts on the state of statistical inference. George Gabor, Dalhousie University
- 10.02.2000 - The problem of steady two-dimensional flow parallel to a finite flat plate. S.C.R. Dennis, University of Western Ontario
- 14.02.2000 - An end of the century progress report along on path of analysis. S. Swaminathan, Dalhousie University

- 21.02.2000 - A century of invariant subspaces. Gordon MacDonald, University of PEI
- 20.03.2000 - The Hilbert-Smith conjecture: A survey. Dusan Repovs, University of Ljubljana, Slovenia
- 23.03.2000 - Smooth bump functions. R. Fry, St. Francis Xavier University
- 30.03.2000 - On the numerical solution of differential equations with algebraic constraints. R. Spiteri, Acadia University
- 03.04.2000 - A mathematical model of bioremediation. John Chadam, University of Pittsburgh
- 04.04.2000 - The early exercise boundary for an American put option: analytical and numerical approximations. John Chadam, University of Pittsburgh

---

STATISTICS DIVISION NEWS

GRADUATE STUDENTS

Recent graduates:

Changchun Xie, MSc, supervised by B. Smith, is now enrolled in a PhD program at the University of Guelph.

J. Concepcion Loredo Osti, PhD, supervised by B. Smith, is now doing a post-doctoral fellowship at McGill University in the area of Statistical Genetics.

Prospective PhD Graduates, October 2000:

Nick Barrowman, PhD, supervised by C. Field and R. Myers (Biology), has accepted a position with the Children's Hospital of Eastern Ontario in Ottawa.

Joanna Mills, PhD, supervised by C. Field and D. Dupuis (Eng. Math.), has accepted a position with Morneau Sobeco in Halifax.

Sanjoy Sinha, PhD, supervised by C. Field and B. Smith, has accepted a post-doctoral fellowship at the University of Alberta.

SEMINARS

DATE ,TITLE AND SPEAKER

- 23.09.99 - Some aspects of robust estimation in time series analysis. Sanjoy Sinha, Dalhousie.
- 30.09.99 - Dogs and fleas, dice and molecules, or why the normal distribution has been such a runaway success? Dr. George Gabor, Dalhousie.
- 07.10.99 - An introduction to S-PLUS. Nick Barrowman, Dalhousie.
- 14.10.99 - Mixed stock analysis (a thesis proposal). Patricia Moorhead, Dalhousie.
- 21.10.99 - Using generalized linear mixed models in the meta-analysis of spectral data. Dr. Ransom A. Myers, Killam Professor (Biology), Dalhousie.
- 04.11.99 - Odds ratio inference by substitution of discordant pairs. Dr. Gordon Flowerdew, Community Health and Epidemiology, Dalhousie.
- 18.11.99 - Symbolic cumulant calculations of frequency domain time series. Dr. Bruce Smith, Dalhousie.
- 02.12.99 - System identification by a Hankel matrix method. Paul Scott, Dalhousie.
- 20.01.00 - Method for detecting influential observations. Dr. R.P. Gupta, Dalhousie.
- 27.01.00 - Confidence intervals for robust regression. Dr. Chris Field, Dalhousie.
- 03.02.00 - A random efforts model for diseases with heterogeneous rates of infection. Dr. Guoqi Qian, La Trobe University, Australia.
- 10.02.00 - The quality of inference in logistic regression models. Dr. Michael Brimacombe, Atlantic Veterinary College, University of P.E.I.
- 17.02.00 - Life as a biostatistical consultant: confrontations with data. Dr. Gordon Flowerdew, Community Health and Epidemiology, Dalhousie.
- 24.02.00 - Retrospective Estimation of the Birth Prevalence for Delayed Onset Disorders: Application to Cystic Fibrosis in Nova Scotia. Dr. David Hamilton, Dalhousie.
- 09.03.00 - Investigating health issues using large population-based databases. Drs. K.S. Joseph and Linda Dodds, Perinatal Epidemiology Research Unit, Dalhousie University.
- 10.03.00 - On estimation of the four-parameter Kappa distribution. Connie Winchester, Dalhousie.
- 16.03.00 - Assimilating data into models of the coastal ocean using the incremental approach: Getting the right answer with wrong model. Dr. Keith R. Thompson, Dalhousie.

- 23.03.00 - How to make inference from samples with fat tails? Professor John Rumsey, School of Business Administration, Dalhousie.
- 31.03.00 - Parameter flows. Dr. Jim Ramsay, Psychology Department, McGill University.
- 06.04.00 - Tools for assessing the reliability and validity of clinical information. Drs. John LeBlanc & Joanne Langley, Department of Community Health and Epidemiology and Pediatrics, Dalhousie University.

FACULTY NEWS

We continue to develop statistical genetics as a focus area. Recently Christophe Herbinger was appointed to a joint position in statistics and biology, and will be working in the area of resource conservation genetics. A post doctoral fellow, Ken Butler, together with faculty members Ed Susko, David Hamilton, Chris Field and Bruce Smith have been involved in various aspects of statistical genetics research, including pedigree estimation, estimation of quantitative traits, the analysis of DNA chip data, and sequence alignment. Field and Smith are associated with the MITACS NCE project (Mathematics of Information Technology and Complex Systems, Network Centre of Excellence) on the analysis of complex traits. Chon Loredo-Osti completed a Ph.D. on the analysis of quantitative trait loci in September and is now a post-doctoral fellow at McGill University. Three other graduate students, Michele Millar, Patricia Moorhead and Martin Perry are currently working on problems in statistical genetics. During the winter 2000 term, David Hamilton offered a course in statistical genetics, and another course at the fourth year/graduate level will be offered in fall 2000.

Keith Thompson is a member of the Global Ocean Observing System (GOOS) panel supported by the Intergovernmental Oceanographic Commission, the World Meteorological Organization and UNESCO. He attended panel meetings in Accra, Ghana in April 1999, Tianjin, PRC in November 1999 and most recently Gdansk, Poland in May 2000. The panel is developing a strategic plan to establish an observing system (including in situ and satellite borne sensors) for the world's coastal seas. Keith has been awarded a number of grants over the last year including funding to (i) predict surface currents on the Scotian Shelf for search and rescue applications (ii) determine the geoid (the shape of the earth) for geo-referencing and oceanographic applications (iii) predict the underwater acoustical environment from remotely sensed data such as surface temperature and sea surface height measurements from satellites. Keith has

given a number of invited talks over the last year including one at the Gordon Research Conference in New Hampshire, and another at the Stennis Space Center, Mississippi.

STATISTICAL CONSULTING SERVICE

The Statistical Consulting Service, with full-time employee Wade Blanchard under the supervision of Chris Field, has had another busy and productive year. Along with numerous smaller projects, the Service has participated in three major studies. In collaboration with Dr. Sara Iverson, from the Department of Biology, we have worked on the problem of estimating mammal diets on the basis of their fatty acid signatures and the signatures of various prey species. Results of this study could have a major impact on the management of fish stocks, for example. We have also been involved in the design and analysis of several clinical trials to study vaccine efficacy conducted by Dr. Scott Halperin, from the Clinical Trials Research Center at the IWK-Grace Health Centre. In collaboration with Dr. Ken Rockwood, Department of Geriatrics, we have analyzed the results of a clinical trial to study a drug for the treatment of Alzheimer's patients.