

School of Mathematics, University of Minnesota

Newsletter Volume 14, Spring 2008



From the Head



From the Head	1
Lawrence Gray	
Welcome to New Faculty	2
Tyler Lawson	
Jon Rogness	
Kathrin Bringmann	
Igor Pak	
Bryan Mosher	
Featured Colleagues	4
Nick Krylov	
Doug Arnold	
Markus Keel	
Alexander Voronov	
IMA News	5
MCIM	6
Symposium	6
Yamabe Symposium: Early History	
Master of Financial Mathematics	7
Remembering a Former Colleague (Staff)	7
Shirley Ward	
ITCEP	8
Graduate Program	8
Undergraduate Program	9
IT Bowers' Award	
2007 Good Teaching Awards	
Contacting Us	10

Maybe it's because I'm getting older, but this year has seemed to pass by rapidly. Or perhaps the reason is that I have been a little extra busy. I decided this year that I was comfortable enough with my administrative duties to allow myself the luxury of teaching (and re-designing) a probability course, both in the Fall and in the Spring. The material I chose for the course has been a lot of fun for me to teach, and the students have worked very hard. This is one of the reasons I got into the math business in the first place!

As is typical for a department this size, there have been a few changes in personnel this year. Since the last newsletter, four new faculty have been hired: Igor Pak, who was an Associate Professor at MIT, joined us in Fall 2007 (we hired him at the end of last year). Competition to hire him was fierce, but we got the prize in the end. You can read more about him in this newsletter. During the current hiring season, we successfully recruited three more young faculty members: Yoichiro Mori (scientific computation and math biology, from the University of British Columbia), Panos Stinis (numerical analysis of PDEs and applied mathematics, from the Center for Turbulence Research at Stanford University), and Anar Akhmedov (symplectic geometry and low-dimensional topology, from Georgia Tech). Each of these fills a position that has been vacant for several years.

There have been some administrative changes as well. Dick McGehee took over as Director of Graduate Studies, as our former director, Scot Adams, became the Director of the new Financial Math program. Sasha Voronov served in the position of Associate Head of the department, replacing Rick Moeckel, who was on leave in the Fall. I appointed Jack Conn as co-Director of Undergraduate Studies, to assist the Director of Undergraduate Studies, David Frank, with the overwhelming number of tasks in that office, particularly with the scheduling of instructors and TAs for math courses. And Fernando Reitich took over as the Director of the MCIM, as Fadil Santosa spent the year at the University of British Columbia (before returning to us to become the new Director of the IMA). There was also a change in our office staff: we are pleased to welcome Bonny Fleming to Vincent 127. Among many other things, she will provide valuable support for our new Financial Math program. (For more about the new Financial Math program and the MCIM, please see the corresponding articles in this newsletter.)

That's not the end of all the changes. Doug Arnold is ending his time as Director of the IMA (after 7 years). His time there has been hugely successful, and it is largely due to his efforts that the IMA has become the leading NSF-funded mathematics institute in the United States. The University of Minnesota has just recently recognized this and many other achievements on his part by making him a McKnight Presidential Endowed Professor. This is among the highest honors bestowed by the U of M. In the past few weeks, Doug was also awarded a Guggenheim Fellowship. For all these reasons, finding someone to replace him as IMA Director was a daunting task. A very thorough and vigorous national search was carried out by members of the IMA Board of Directors. A number of highly distinguished candidates were identified, from all over the country. And in the end, one candidate rose to the top of the list: Our very own Fadil Santosa. He will begin his official duties this summer (that's the second change). We congratulate both Doug and Fadil! Last but not least, Andrew Odlyzko is also ending his time (6 years) as Director of the Digital Technology Center and will be returning to the School of Mathematics, after spending some (highly deserved) time on leave next year.

On a final note, this is the last time I am writing as Head of the School of Mathematics for the Newsletter. I would like to thank my colleagues and staff for their kind support over the past five years.

Welcome to Incoming Faculty and New Postdoctoral Appointees

Tyler Lawson

Tyler Lawson joined the School of Mathematics as an assistant professor in fall, 2007. He was born in Calgary, Alberta, Canada, and attended the University of Calgary before going to graduate school at Stanford University. What at Stanford, he won an ARCS award for outstanding science students. Tyler's advisor was Gunnar Carlsson. (As an incidental remark, Gunnar Carlsson and Carlsson's advisor, Jim Milgram, were both Ordway visiting professors here at Minnesota. Jim Milgram has a Minnesota doctorate and is the son of Arthur Milgram who helped found the well-known group in Partial Differential Equations at Minnesota during the 1950's).

After finishing at Stanford, Tyler went to Massachusetts Institute of Technology (M.I.T.) where he was both a Moore Instructor and then an N.S.F. (National Science Foundation) postdoc (he is a U.S. citizen).

Tyler's interests include algebraic topology, K-theory, and structured ring spectra. We are delighted to have him in the School of Mathematics.

Jon Rogness

Jon Rogness was born in Duluth, and attended Central High School in St. Paul. He then attended Augustana College in Sioux Falls, South Dakota, taking off for a year as a Fulbright Fellow in Erlangen, Germany.

He wrote a thesis in Model Categories here at the University of Minnesota, while also contributing to the ITCEP (Institute of Technology Center for Educational Programs) Program. He is now the Associate Director of the Center for Educational Programs in the Institute of Technology and jointly an assistant professor of Mathematics.

Jon recently won a prize, with Doug Arnold, for computer visualization. It is a pleasure to have him here in these many capacities.

Kathrin Bringmann

Kathrin Bringmann, an Assistant Professor in the School of Mathematics, received her Ph.D. degree in July 2004 from the University of Heidelberg under the supervision Winfried Kohlen. Before joining our department in the fall of 2007, Kathrin held a Van Vleck Assistant Professorship at the University of Wisconsin-Madison between 2004-07. Her research interests include number theory and combinatorics

involving elliptic and Siegel modular forms, Maass forms, partitions, and mock theta functions.

While at UW-Madison, Kathrin in joint work with Ken Ono, Professor of Letters and Science, solved a legendary number-theoretic problem which goes back to the great Indian mathematician Srinivasa Ramanujan, who formulated a special case of the problem shortly before his death, in a 1920-letter to the British mathematician G. H. Hardy. Despite the efforts of many first-rate mathematicians, the problem remained intractable for more than eight decades. The problem concerns the so called mock theta functions, these being defined by some series, and very similar in many respects to classical theta functions used by the great German mathematician Carl Gustav Jacob Jacobi around 1833 to prove, for instance, his celebrated exact formula for the total number of ways a given positive integer can be represented as a sum of four squares. In their work, Bringmann and Ono established the link between mock theta functions and the theory of automorphic forms, one of the richest and most profound areas in mathematics. Their work is bringing new insight into our understanding of these functions which are known for decades to occur in many fields and areas ranging from Mathematics and Physics to cancer research.

Igor Pak

Igor Pak was born in Moscow in 1971. In 1985-88 he attended High School 57, not far from the Kremlin. In the 1970's the high school was reorganized, and became focused on Mathematics and Physics, and succeeded in hiring expert teachers. So, this was an intellectually exiting place.

In 1989 Igor was admitted to Moscow State University. His undergraduate adviser was Alexandre Kirillov. Igor also had contact with other faculty, including Professors Gelfand and Arnold. In fact, promising undergraduates were treated like colleagues by the famous members of the Mathematics Faculty. Igor remembers playing volleyball with his professors.

Igor did not wish to serve in the Soviet Armed Forces, a duty that every graduate of a Soviet university had to perform. So, he decided not to graduate from Moscow State University, although he essentially had all the requirements. Instead, he emigrated to the US. He arrived in Brooklyn in 1993 and stayed with relatives. After spending a year as a visiting scientist at New York University, he applied to the Ph.D. programs of several American universities. One of these was the University of Michigan. Since he had no Bachelor of Science degree, Michigan refused to admit him into their Ph.D. program, but forwarded his application to their undergraduate program. In other words, Michigan demoted him to an undergraduate. This demotion was painful for him. So,

when he got accepted by the graduate schools of Harvard, MIT, Pennsylvania and Brandeis universities, he sent copies of the letter of acceptance to Michigan. Michigan then realized their insensitive handling of his application and sent their apologies.

The application to Harvard was also not conventional. Being a refugee, Igor felt that his chances of getting into Harvard was slim and most likely he would lose the \$70 application fee, which was a large sum for him. When he described his feelings to a friend, the friend offered to pay for it. The next hurdle was the GRE exam that he took in Brooklyn. This was a three hour exam, and there were a total of two candidates and approximately sixty problems. The other candidate finished it in about half an hour. It took Igor two and a half hours and he was convinced that the other candidate was a genius. It was a big surprise when he got the letter of acceptance from Harvard.

After three years, Igor got his Ph.D. from Harvard with a thesis on "Random walks on groups: Strong uniform time approach".

His first postdoc position was at Yale, during 1998-2000. Pak, being a popular Korean name, was assigned a Korean TA who spoke hardly any English. To put it mildly, this was an interesting teaching experience.

Pak joined MIT in 2000-2001 as an Assistant Professor. In 2005-2006 he was promoted to an Associate Professor. He joined Minnesota in 2007. We are indeed fortunate to have him.

Bryan Mosher

Bryan Mosher was born in Circleville, Ohio, the pumpkin capital of the world. He attended Ohio University's Honors Tutorial College, where he proudly carried the Red, White, and Blue (Munkres, Spivak, and Herstein).

He began graduate his study at the University of Illinois at Urbana-Champaign, and finished in 1998 at the University of Illinois at Chicago. He wrote his thesis, "Displacement estimates for hyperbolic manifolds", under the direction of Peter Shalen and with the support of a Sloan Dissertation Fellowship.

He took a National Science Foundation post-doctoral fellowship and a postdoc position at the University of Michigan, taking care to conceal his Buckeye roots. He continued there until fall 2007 as a lecturer, working on programs that aim to recruit and retain minority students in math and science.

In addition to his work with minority students, Bryan has considerable experience with many other issues in undergraduate math education, including helping graduate students to improve their teaching skills and the design of curriculum for prospective K-12 math teachers. We look forward to the impact that he will have on our department in these and other areas that impact on our teaching mission.

Featured Colleagues

Nick Krylov

Nick Krylov, Ordway Professor of Mathematics at the



University of Minnesota, was born in the old Russian city, Vladimir, but after a short while, his family moved to a small settlement. The system permitted all talented students to move up by examination to Moscow State University, although students from Moscow or St. Petersburg had a clear advantage in

preparation. As a student in Moscow, Nick attracted the attention of the famous mathematician E. Dynkin, who eventually asked him to be his student. This also made it possible for Nick to live in the same place as his wife, Julia. In these student years, Nick also attended the lectures of the late Boris Levitan, who lived in retirement here in Minneapolis.

As a young mathematician, Nick found himself living in crowded conditions and dreamed of buying an apartment. This led to the “eternal search” for “hard currency”. At that time, one’s ability to get such currency was connected with travel abroad. For example, he was once invited to visit Poland, but it took two letters from the famous mathematician N. Bogolyubov before permission was granted.

At that time, the Russian government developed foreign aid programs that included sending teachers to so-called third-world countries. Perhaps this was similar to our Fulbright scholars or Peace Corp. In return, Russia would gain strategic use of ports in places such as the Indian Ocean.

In this way, Nick was able to spend 3 years in Madagascar; he then returned to Moscow for 6 months. Then armed with letters of invitation from Gene Fabes, he and his family set out for what was officially supposed to be a one month visit to Minnesota. And, as they say on the radio, “the rest is history”.

It is impossible to describe in a short note the scope and significance of scientific contribution by Nicolai Krylov.

Perhaps there are not more than a dozen mathematicians in the world with such a broad expertise. Stochastic Processes, Partial Differential Equations (PDE), Control Theory and Optimization are the areas in which Nick has made fundamental discoveries which revealed new links between them, and opened new perspectives. His input to these areas was recognized by the mathematical community. He had been selected to present Invited Addresses at the International Congress of Mathematicians twice in two different sections: Control Theory (1978, Helsinki) and PDE (1986, Berkeley).

At the beginning of the 70s, he obtained new estimates for stochastic integrals, and used them in order to construct the theory of Optimal Control for a wide class of processes. In the work of the preceding researchers, diffusion was not controllable (except for one- and two-dimensional cases), so that the corresponding Bellman equation was quasilinear, i.e. linear with respect to second order derivatives. The fact that now many textbooks in PDE include “Fully nonlinear equations” as a separate chapter is mainly due to Nick’s work.

Nick Krylov has played a very important role in bringing mathematicians to our department. S. Bobkov and M. Safonov are outstanding examples, but his presence has surely elevated the level of some of our short term visitors. For example, to the Rivière-Fabes Symposium. He has been honored with prizes and memberships in academies.

Finally, the committee asked Nick if he had any regrets. His answer, “absolutely none whatsoever. If I die tomorrow, I am a happy man.”

Doug Arnold

Professor Douglas Arnold, director of the IMA (Institute for Mathematics and its Applications) was born in suburban New York City. He did his undergraduate work at Brown University,

where he was inspired by Professor Herbert Federer (whose work on geometric measure theory is world famous), and then went on to graduate school at the University of Chicago. Doug was initially interested in algebraic geometry, reading papers by Serre and others, but he felt a need to do something more concrete. This led Doug to approach Professor Jim Douglas, whose record in



training people in numerical analysis is quite extraordinary. The relationship was quite successful, and when he finished his PhD,

Doug went to Maryland which, at the time, was one of the best places in his field.

At Maryland, Doug worked with Professor Ivo Babuška, who maintained a close hands-on relationship with young faculty. Doug recalls that when he arrived, Babuška asked how early in the morning he could call (they settled on 7:00 am). After a successful period in Maryland, Doug was invited to give a talk at Penn State University.

When he arrived at Penn State, the chairman introduced him to various people, including a woman who was to show him around town. In fact, the lady turned out to be a real estate agent. This was a rather unusual ploy, but Doug did join the faculty at Penn State shortly after that.

While still at Penn State, Doug spent a year at the IMA. Doug and his wife, Carme Calderer (currently a professor at the University of Minnesota) were married in a small ceremony at 1701 University Avenue during that year. Fifteen years later, when Doug was offered the Directorship of the IMA and Carme was offered a professorship at the University of Minnesota, Carme was interviewed by the Dean in the very same room at 1701 University Avenue (which had been converted from a church to a university building). Doug is currently completing a seven-year term as Director of the IMA.

Doug's work has been honored in many ways. For example, he was plenary speaker at the International Congress of Mathematicians in Beijing (2002). Just this year, Doug was elected to become the president of SIAM (the Society of Industrial and Applied Mathematics). In a different area, Doug (along with Jon Rogness, Assistant Professor of Mathematics) won an honorable mention in the International Science and Engineering Visualization Challenge for their video "Möbius Transformations Revealed". First released on YouTube in June 2007, it has been viewed well over a million times.

It is a pleasure to have such a distinguished colleague in the School of Mathematics.

Markus Keel and Alexander Voronov

We are pleased to announce the promotion of our colleagues, Alexander Voronov and Markus Keel, to full professor.

Congratulations!

IMA News

On Thursday evening, November 1, 2007, the Institute for Mathematics and its Applications (IMA), of the University of Minnesota, presented the U.S. premiere of the film "Achieving the Unachievable" by the Canadian film-maker Jean Bergeron. The film, which lasts a little less than an hour, is devoted to the work of the well-known Dutch artist Maurits Cornelis Escher.

In particular regarding his unfinished work called the "Print Gallery", the art world has long been puzzled by the blurry white circular patch in the center of this lithograph. There has been considerable speculation about why the artist left his masterpiece unfinished in this way and whether it could be completed. A team assembled by the distinguished mathematician, Hendrik Lenstra of the University of Leiden in the Netherlands, discovered that an infinite sequence of ever-decreasing copies of the outer portions of the painting, subject to a subtle transformation which they deduced, fits perfectly in the blank disc. Interviews with Lenstra in the film suggest a fantastic bridge that grew between the intuitions of the artist and the mathematician.

The film also contains interesting interviews with artists and mathematicians such as Douglas Hofstadter of the University of Indiana (author of "Gödel, Escher, Bach"), who had conjectured that the completion of "Print Gallery" ultimately obtained by Lenstra would be impossible. The film illustrates many mathematical structures which enter into Escher's work, including Möbius transformations, which are illustrated with an animation developed by Douglas Arnold, Director of the IMA, and Jonathan Rogness, Assistant Professor of Mathematics at the University of Minnesota. The film was received enthusiastically by the audience of approximately seven hundred people, including many high school students as well as members of the University and surrounding communities. The film's writer/director, Jean Bergeron, was present for the premier and took questions from the audience at the end of the film.

Details of all the IMA activities are available on their web page www.ima.umn.edu.

Minnesota Center for Industrial Mathematics (MCIM)

Some significant changes took place during the past year at MCIM. Fadil Santosa who served as director of MCIM from 2000 to 2007 stepped down to prepare for his new role as the next director of the NSF-funded Institute for Mathematics and its Applications in the summer of 2008. Fadil was replaced by Fernando Reitich who had been serving as associate director. We expect that the intimate knowledge of the MCIM programs that Fadil has garnered in his years as director will be extremely beneficial in taking advantage of further potential synergies that exist between MCIM and IMA. The Center and the Institute already collaborate in the organization of the "IMA/MCIM Industrial Problems Seminar" (see <http://www.ima.umn.edu/industrial/>) and further cooperation will surely enhance the industrial outreach activities of both organizations.

Another important development relates to the expansion of the MCIM activities to encompass a more systematic approach to collaboration with the financial industry. This has been implemented as a complement to and in support of the new Masters in Financial Mathematics (MFM) program (<http://www.math.umn.edu/finmath/>) which was established in the School of Mathematics in the fall of 2007. MCIM is providing a unique opportunity to students in this new program, by bringing its accumulated experience and recognition to enable interested students to attain practical experience through summer internships in the financial sector, and to assist them in their search for permanent employment. These activities constitute a natural outgrowth of the work at MCIM which has included similar support for our regular graduate programs for almost fifteen years.

These expanded efforts on internships and placement at MCIM have further confirmed their significant impact at various levels, ranging from the School's visibility and graduate recruiting and employment, to education and national competitiveness. On education, the exposure to mathematics beyond the academic realm that our students experience during their internships is consistently illuminating, and oftentimes life changing. From an industrial viewpoint, on the other hand, the availability of a pool of talented and quantitatively trained students has proven invaluable to a variety of companies who continually appeal to MCIM in their search for interns and high-level employees. Beyond the largely engineering-focused companies that have comprised MCIM's contact base, the new concerted efforts in mathematical finance have uncovered an equal need of companies in this area to identify suitably trained candidates. Over the last year,

MCIM has been flooded with requests for interns and job postings in quantitative finance coming from the most varied sources, including diversified financial groups (such as Securian, Allianz, Riversource), banks (Wachovia, US Bank), consulting firms (e.g. McKinsey, Sound Capital Management) and alternative investment companies (e.g. Stark Investments, Walleye Trading, Alternative Strategy Advisers, to name a few). We expect our efforts to continue to expand in this direction both in connection with our new MFM program and also as a further avenue for students in our regular MS and PhD programs as we look forward to another successful year at MCIM.

Symposia

Yamabe Symposium: Early History

Most members and friends of the School of Mathematics know about the Yamabe Symposium, a three-day conference in differential geometry and geometric analysis which takes place here every two year. The event began as a bi-annual lecture, but the history goes back way before that.



Hidehiko Yamabe was briefly a professor here in the 1950's. Yamabe was born in 1923 in Japan, near Osaka. He obtained his doctorate degree in Tokyo under Professor S. Iyanaaga. He was an assistant in Osaka and then at the Institute for Advanced Study in Princeton, as Dean Montgomery's assistant. After a few years at Minnesota, Yamabe decided to take a position as a full professor of Mathematics at Northwestern University in the fall of 1960.

While here at Minnesota, Yamabe often complained of headaches. It was not widely known that he had been warned that he could not expect a long life. He suffered a violent hemorrhage and died on November 20, 1960 at the age of 37.

Shortly before coming to America, Yamabe married his wife Etsuko, and by 1956 they had two daughters.

Etsuko Yamabe and her daughters returned to Japan where they lived with the benefits of his social security and funds raised privately by his friends here in America. In time, Etsuko remarried and achieved some financial stability. Her wish to return the kindness shown to her in a time of great need led Etsuko to set up funds for an annual lecture, alternatively at

Northwestern and Minnesota. This was able to attract distinguished mathematicians such as Professor Eugene Calabi. Eventually, with further funding, this was expanded to our bi-annual symposium.

Yamabe's collected works were edited by Professor Ralph Boas for Gordon and Breach in 1967. They continue to influence mathematics to this day.

(The Committee thanks Professors Don Aronson and James Serrin for these photos.)



Hidehiko Yamabe



Hidehiko Yamabe and wife

Master of Financial Mathematics (MFM)



First MFM Class Held at the University of Minnesota

This is the first year of operation of our new profession masters program, Master of Financial Mathematics. As director, it is my pleasure (and duty) to declare it a success, although, like with most endeavors, the start has had some bumps; in our case, the primary one being the level of preparedness of some of the incoming students. The best are excellent, but a few are struggling.

The year began with 54 students of widely varying backgrounds. Of the 54, 13 are female, and exactly half

(27) are international. The academic and professional backgrounds are equally diverse, including people currently working in the finance industry, as well as some who are just out of college. The program is structured with evening classes, to accommodate working professionals, and with the possibility of one-year completion, to accommodate full-time students.

Recruitment last year was good, but this year is even better. As of today (4 February), we have 75 completed applications, whereas, on this date in 2007, we had only 39. Since, moreover, we needn't fill as many "slots", standards for admission will increase dramatically. Also, we are evolving our procedures for course requirements, to ensure that students get all the necessary preparation before tackling the graduate level mathematics that forms the backbone of the program.

Many things about the "launch" have been pleasantly surprising. In addition to the amount of interest from potential students, we have discovered that the size of the local finance industry is quite large, much larger than one would expect given the size of our economy. Moreover, the level of personal commitment that's been made by local practitioners has been gratifying to see. It has been a simple matter to find local quantitative finance professionals to teach our practitioner course, serve on the Advisory Board, contribute to the program and offer welcome advice at an informal level. We regularly receive inquiries from local companies about availability of our students for jobs and internships. The MCIM (Minnesota Center for Industrial Math), particularly Fernando Reitich, has been invaluable in sorting through requests and working to fill them.

Practitioner seminars are well attended, and we will soon need to move to a larger room. Interestingly, through our seminars, the School of Mathematics has become a nexus for people from all over the local finance industry. Serving as a catalyst that can develop this industry into a community is a very nice (if unintended) consequence of our new program.

Remembering a Former Colleague (Staff)

It is with sadness that we must report the death of Shirley Ward who served for many years as the head secretary and administrator of the School of Mathematics.

IT Center for Educational Programs (ITCEP)

The Institute of Technology Center for Educational Programs has a number of new partners in its mission to develop educational programs in mathematics and its related science and engineering applications. Dozens of new teachers joined our elementary- and middle-school professional development network, and we are excited to announce a partnership with the Austin, MN school district. The district will use funds from the Hormel Foundation to send eight teachers to our three-week long development course this summer. Registration for the other 35 available slots in the course will open shortly.

Over 350 students are enrolled in our flagship program, the University of Minnesota Talented Youth in Mathematics Program (UMTYMP). The majority attend classes on the Twin Cities campus, with a handful in St. Cloud as well. We have a new instructor lined up to teach UMTYMP in Rochester and are optimistic about reinstating the program there. Nearly 50 UMTYMP alumni are currently undergraduates at the University of Minnesota; 10 are graduate students here. Eighteen have earned Ph.D.s in Math.

This year 500 students in grades 4-7 participated in ITCEP's academic year enrichment programs. The largest single program, Girls Excel in Mathematics (GEM), provides enrichment activities for nearly 200 girls in grades 4-6, encouraging them to continue studying mathematics. The program has grown so large that GEM sessions use every classroom in Vincent Hall, along with extras in Ford and Murphy. GEM is supported by the local non-profit Center for Energy and Environment, with other materials provided by major research centers within the Institute of Technology.

The 2008-09 enrichment programs will kick off with the 17th Annual Math and Science Fun Fair on September 20, 2008 in Coffman Union from 10am-3pm. The fair includes activities and demonstrations for school age children and their families. Mark your calendars!

Graduate Program

Richard McGehee, Director of Graduate Studies in Mathematics and The Graduate School congratulates our recent graduating Ph.D. students (October, 2006 to December, 2007).

Yanlai Chen, *An Adaptive High Order Discontinuous Galerkin Method with Error Control for the Hamilton-Jacobi Equations*, Bernardo Cockburn, advisor; Division of Applied Mathematics, Brown University.

Kevin D. Collins, *An Inverse Problem in Determining the Electrical Potential on the Heart*, Fadi Santosa, advisor; Alliant Tech Systems, Monterey, CA.

Bo Dong, *Superconvergent Discontinuous Galerkin Methods for Elliptic Problems*, Bernardo Cockburn, advisor; Division of Applied Mathematics, Brown University.

Ning Jia, *Matroids, Schubert Polynomials and Fibonacci Trees*, Dennis E. White, advisor; Virginia Tech.

Yoon Mo Jung, *Variational Modeling, Analysis and Computing of Image and Visual Segmentation Problems*, Jianhong Shen, advisor.

Juraj Huska, *Qualitative Properties of Second Order Parabolic Equations*, Peter Polacik, advisor; Alternative Strategy Advisers, LLC, Minnetonka, MN.

Upali Parakrama Karunathilake, *A Representation Theorem for Certain Solutions to Burger's Equation*, Vladimir Sverak, advisor; Bloomsburg University, Bloomsburg, PA

Sangwook Kim, *Topology of Diagonal Arrangements and Flag Enumerations of Matroid Base Polytopes*, Victor Schorr Reiner, advisor; Department of Mathematical Sciences, George Mason University.

Yang-Jin Kim, *Mathematical Modeling of Cell Movement and Tumor Spheroid Growth in vitro*, Hans George Othmer, advisor; Mathematical Biosciences Institute, The Ohio State University.

Michalis Kyriacos Kontovourkis, *On Elliptic Equations with Low-regularity Divergence-free Drift Terms and the Stead-state Navier-Stokes Equations in Higher Dimensions*, Sverak, Vladimir, advisor;

Chang Hyeong Lee, *Stochastic Analysis of Biochemical Reaction Networks*, Hans George Othmer, advisor; Math Department, Worcester Polytechnic Institute, Worcester, MA.

Jun Luo, *On the Rate of Convergence of the Finite-Difference Approximations for Parabolic Bellman Equations with Constant Coefficients*, Nicolai V. Krylov, advisor; consulting company on the East coast.

Molly A. Maxwell, *Enumerating Self-Dual Spanning Trees and Self-Dual Matroid Bases*, Victor Schorr Reiner, advisor; Augsburg College, Minneapolis.

Deepa Mahajan, *Boundary-Conforming Discontinuous Galerkin Methods via Extension from Subdomains*, Fernando Leiva Reitch and Bernardo Cockburn, advisors; Boston Scientific.

Tuoc Van Phan, *On global Existence of Solutions to a Cross-Diffusion System*, Wei-Ming Ni, advisor, University of British Columbia, Canada.

Haiying Wang, *H(div)-postprocessing and Hybridization of the Continuous Galerkin Finite Element Method for Second-Order Elliptic and Linear Elasticity Problems*, Bernardo Cockburn, advisor; Math Department, Colorado State University.

Michael P. Weimerskirch, *On Infinite Indistinguishability Quotient Monoids in Misere Impartial Combinatorial Games*, Bert E. Fristedt, advisor; St. Olaf College, Northfield, MN.

Hang Zhang, *Static and Dynamical Problems of Hydrogel Swelling: Modeling and Analysis*, Carme Calderer, advisor; Postdoc, Mathematics Department, Michigan State University, East Lansing, MI.

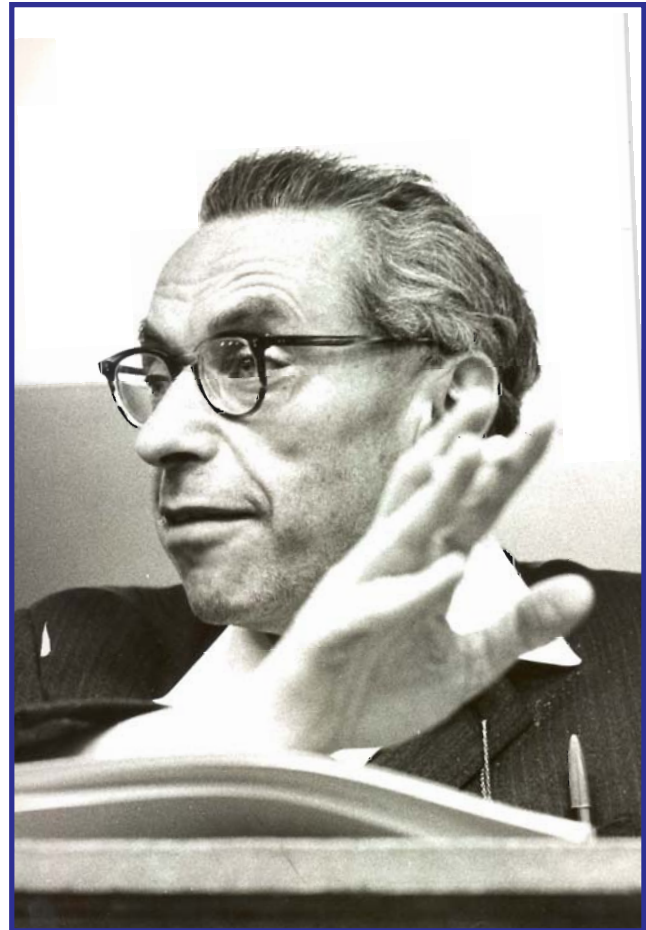
Jose Javier Zuniga, *Compactifications of Moduli Spaces*, Alexander A. Voronov, advisor; Purdue University, West Lafayette, IN.

Donald Kahn, chair of the Newsletter Committee, would like to thank the committee members and others who helped make this possible, especially the department head, whose presence on our committee is quite unprecedented.

Undergraduate Program

Mathematics Department Excellent Teaching Award

We are pleased to announce that our graduate student, Alexander Miller, has just won the Bowers' Award for excellent teaching in the Institute of Technology. This is awarded to a single teaching assistant in any given year. It is a real honor. Alexander Hanhart and Todd Wittman have won this award in the past.



Professor Paul Erdos (Cole Prizewinner) speaking at the University of Minnesota some time ago.

2007 Good Teaching Awards

The School of Mathematics congratulates the following students who were recipients of the 2007 Good Teaching Award.

Christopher Bemis, Patrick Byrnes, Bond Caldero, Yanlai Chen, Langhan Dee, Bo Dong, Ryuhei Ichikawa, Ning Jia,

The Newsletter Committee is composed of Adrian Diaconu, Lawrence Gray, Donald Kahn (Chair), Peter Rejto and Daniel Spirn.

School of Mathematics

University of Minnesota
127 Vincent Hall
206 Church Street S.E.
Minneapolis, MN 55455
<http://www.math.umn.edu>
dept@math.umn.edu
Telephone: (612) 625-5591
Fax: (612) 626-2017

Department Head:

Lawrence Gray
gray@math.umn.edu
Telephone: (612) 625-5591

Graduate Studies

Richard McGehee, Director
mcgehee@math.umn.edu
Telephone: (612) 624-9040

Undergraduate Studies:

David Frank, Director
Telephone: (612) 625-4848
frank@math.umn.edu

Master of Financial Mathematics:

Scot Adams, Director
Telephone: (612) 625-1035
adams@math.umn.edu

Institute for Mathematics and its Applications (IMA)

Douglas Arnold, Director
Arnd Scheel, Deputy Director
Chehrzad Shakiban, Associate Director
400 Lind Hall
207 Church Street S.E.
Minneapolis, MN 55455-0463
<http://www.ima.umn.edu>
Telephone: (612) 624-6066
Fax: (612) 626-7370

Minnesota Center for Industrial Mathematics (MCIM)

Fadil Santosa, Director
Fernando Reitich, Associate Director
<http://www.math.umn.edu/mcim>
mcim@math.umn.edu
Telephone: (612) 625-3377
Fax: (612) 624-3333

IT Center for Educational Programs (ITCEP)

Harvey Keynes, Director
4 Vincent Hall
206 Church Street S.E.
Minneapolis, Mn 55455
<http://www.itcep.umn.edu/>
Telephone: (612) 625-2861
Fax: (612) 626-2017

School of Mathematics

University of Minnesota
127 Vincent Hall
206 Church Street S.E.
Minneapolis, MN 55455