

School of Mathematics

Newsletter Volume 16, Spring 2010



Head Lines Peter Olver



Head Lines	1
Peter Olver	
MathCEP	3
Welcome to New Faculty	3
Anar Akhmedov	
Featured Colleagues	4
Don Aronson Donald Kahn Harvey Keynes Peter Webb	
Symposia	7
Midwest Topology Seminar Riviere Fabes Symposium	
Awards and Recognition	7
Master of Financial Mathematics	8
IMA	8
Remembering Former Colleagues	8
MCIM	10
Math Library	10
Retirements	10
Kathleen Houser Kathleen Swedell	
Undergraduate Program	11
2010 Barry M. Goldwater Scholars	
Graduate Program	11
Graduate Student Fellowship Awards Ph.D. Graduating Students	
Contacting Us	12

With a beautiful and unexpectedly early Minnesota spring rolling in, I am finally inspired to set pen to paper (or, more accurately, keyboard to screen) to again convey my warmest greetings to all alumni, students, faculty, staff and friends of the School of Mathematics. My second year in office is swiftly drawing to a close. While budgetary clouds continue to darken the horizon, the near term trajectory of the department gives cause for cautious optimism. I would like to take this opportunity to report on some of the more significant developments, achievements, and milestones since I last wrote.

Our younger colleagues have been particularly active this year, garnering an impressive number of recognitions and awards. Some highlights: Duane Nykamp, who works in mathematical neuroscience, was promoted to Associate Professor with tenure. Tyler Lawson was awarded a highly prestigious Sloan Fellowship for his research in algebraic topology. Last year's Sloan Fellow, Yoichiro Mori came through again with a McKnight Land-Grant Professorship in recognition of his research on mathematical models for cellular electrical activity. Last summer, Marta Lewicka was awarded a five year Career grant, which is the National Science Foundation's most notable award in support of junior faculty. I have heard that two additional Career awards are in the works, but to announce details just yet would be premature. And Kathrin Bringmann was awarded the one million euro Krupp Prize, being only the third mathematician since its inception in 1986. The senior faculty have not been slacking off, either. For example, Bernardo Cockburn is an invited sectional speaker at the International Congress of Mathematicians (ICM) in Hyderabad, India this summer, while Fadil Santosa was recently named a SIAM Fellow.

Despite tough economic times, we were thankfully able to hire new faculty to help shore up our programs. Gregg Musiker, currently at MIT, and Pavlo Pylyavskyy, at the University of

Michigan, have both accepted our offer of a tenure track assistant professorship. Both Gregg and Pavlo are outstanding researchers in combinatorics, and will be welcome additions to our internationally renowned and very popular program. I look forward to their arrival in Minnesota this fall.

In less welcome developments, two of our high profile faculty have decided to resign their positions here. Kathrin Bringmann has assumed a professorship at the University of Köln (Cologne) in her native Germany, while Igor Pak was lured away by the University of California in Los Angeles (UCLA). While I wish them every success in their future careers, their presence and contributions here in Minnesota will be sorely missed.

Two of our long serving colleagues — Donald Kahn and Willard Miller, Jr. — will complete their retirement at the end of the academic year. Don joined the Department in 1964 and is a recognized researcher in algebraic topology, textbook author, and former Director of Graduate Studies. Willard, who joined the following year, is *the* world expert in the theory of symmetry and separation of variables, and, more recently, superintegrability. Besides his many research accomplishments, Willard has an unrivaled record of University service, having been, at various times, Department Head, Associate Director and Director of the IMA, as well as Associate Dean and then Acting Dean of the Institute of Technology. Don is the subject of a featured colleague profile below, while Willard was featured in last year's Newsletter. Personally, I will particularly miss Willard, as his stewardship of the Department was the primary reason I applied to the University of Minnesota in 1980. While they will no longer be on the regular faculty rolls, I am pleased that both Willard and Don assure me that their presence in Vincent Hall will continue to be felt for many years to come.

In sad news, four of our emeritus faculty — Marian Pour El, Edgar Reich, Leon Green, and Warren Loud — passed away since the last newsletter was distributed. (Obituaries appear later in this newsletter.) A memorial service for the five emeritus faculty who died last year (Aeppli, Green, Joichi, Pour El, and Reich) was held in the fall in the math library, featuring cello music and heartfelt remembrances by colleagues, friends, and family.

This year has also witnessed several significant changes to the Department's staff. Long term members Kathy Swedell (32 years) and Kate Houser (30 years) both decided to retire last fall. We are all extremely grateful for their many contributions and years of service, and wish both of them a happy and productive retirement. To help cover our essential services, Sam Richter was hired in January, and is a very welcome addition to the Department's staff.

In administrative news, I am very happy to report that Mark Feshbach has agreed to take the baton from Larry Gray, and will become our new Director of Undergraduate Studies, effective this summer. He will be assisted by Bryan Mosher, who has been serving as Associate Director of Undergraduate Studies since the beginning of the academic year. Rina Ashkenazi has agreed to serve as the new Director of our undergraduate Actuarial Program (see also below). As in last year's message, I must profoundly thank Larry for his many years of service, first as Director of Undergraduate Studies, then my predecessor as Head of Department, after which he selflessly agreed to return to his old job. I am sure he is looking forward to unwinding next year.

Dick McGehee is continuing to do a phenomenal job as Director of Graduate Studies, and our hands-on recruiting has been paying big dividends in attracting many top US students along with a diverse international contingent. Given the unanticipated and unavoidable drop in graduate admissions last year, I am very happy to report that the number of new graduate students we will admit this year is back to more normal levels, aiming for an entering class of 20, including 4 in the Math Education Masters' Program. Last weekend saw a very successful open house, where prospective graduate students were informed and entertained, including a well-received performance by the Vincent Hall Thespians depicting the life of a mythical math graduate student.

The reorganization of the Graduate School anticipated in last year's letter has turned out to be more noise than substance, and the basic structures remain as before, with some apparently minimal changes in administration and purview. You may recall last year's concerns about the job prospects faced by our graduating Ph.D. students. I am thus extremely happy to report that all 22 new Ph.D.s (a record!) successfully landed quality postdoctoral and other positions at a wide range of prestigious institutions, both in the US and overseas, including Duke, New York University, Vanderbilt, McGill, Paris, Lisbon, and elsewhere. This year, our graduating class will be a bit smaller, but I am hoping that similar successes will be reported by this summer.

One significant organizational change is that, effective next academic year, classes that have been traditionally taught at night in Extension will no longer be offered through the College of Continuing Education, but will be incorporated into the regular undergraduate instruction program in the Department. This has resulted in a significant influx of resources, and is one of the main reasons why we have been able to hire new faculty and also bring our graduate admissions back up to a more normal level. Mark, Larry, Dick, Bryan and I have been working hard to devise a plan for the incorporation of these classes. It remains to be seen how successful our reorganization will turn out, and no doubt some further fine tuning will be in order as we seek an optimal balance between day, late afternoon and evening classes.

In the fall of 2009, the I.T. Center for Educational Programs (ITCEP) changed into MathCEP, and was reabsorbed back into the Department. MathCEP's most prominent program is UMTYMP (the University of Minnesota Talented Youth Mathematics Program), which continues to serve hundreds of bright secondary school students in an accelerated learning environment in classes held at the University. UMTYMP and MathCEP owe their existence to Harvey Keynes' pioneering efforts in furthering secondary education of talented students by research level universities, and continue to attract the best and brightest throughout the area. Many have gone on to successful careers in mathematics in their own right, including some colleagues here at the University. As Harvey scales back his duties, I have asked Jon Rogness to step in as the new director of MathCEP. I will be working closely with Jon, Harvey and the rest of the MathCEP staff as the program continues to evolve.

Our Master's of Financial Mathematics (MFM) program continues to thrive, attracting a record number of applicants. Last spring, the second graduating class consisted of 18 students receiving their degrees. In addition, the Graduate School approved starting a new post-baccalaureate Certificate in Fundamentals of Quantitative Finance (FQF). Plans are underway to inaugurate a new Minnesota Center for Financial and Actuarial Mathematics, to enhance and foster the synergy between the programs to the benefit of students, faculty, and industry. Details are being ironed out as I write. The success of the financial mathematics program is entirely due to the dedicated efforts of Scot Adams, who is

finishing his term as its founding Director. I wish to express my profound gratitude to him for all he has accomplished.

One other change worth noting. The venerable name of our College, the Institute of Technology (dating back to 1935) will be changed to the College of Science and Engineering effective July 1. Dean Steven Crouch decided the acronym IT was too often confused with "Information Technology", and so a change in name was warranted. Otherwise, its overall structure and mission will continue without significant alteration.

Thanks again for your continued interest in and support of the School of Mathematics. If you have comments, questions, or suggestions, please don't hesitate to stop by, call, or send me email.

Mathematically yours,
Peter Olver
olver@math.umn.edu
612-625-5591

School of Mathematics Center for Educational Programs (MathCEP)

This academic year marks both a major milestone and a major transition for the Center for Educational Programs. The Fall 2009 semester was the 30th anniversary of the University of Minnesota Talented Youth Mathematics Program (UMTYMP). After starting with just a few dozen students, the program has thrived and now has thousands of alumni throughout Minnesota and the United States, ranging from mathematics faculty to highly successful doctors, lawyers, and a few professional musicians for good measure! Five UMTYMP alumni are currently in the School of Mathematics graduate program, and dozens are attending the University as undergraduates and taking high level mathematics courses in the department.

The past year also saw a major reorganization of the center. Since 1997 UMTYMP has been run by the Institute of Technology Center of Educational Programs (ITCEP), which worked closely with the School of Mathematics but was administratively separate. This year the center rejoined the department and was rebranded as the Mathematics Center for Educational programs (MathCEP). This is also the final year that Harvey Keynes will be the Director of MathCEP, and Jon Rogness will assume that position starting in 2010-11.

Our outreach and teacher professional development programs continue to be very active. Nearly 20 elementary and middle school teachers completed a summer institute in 2009 on the connections between geometric and algebraic ideas. Those teachers then joined our large network of teachers who participate in academic year seminars and workshops, sponsored by the Park City Math Institute (PCMI). We have received a continuation grant from the Improving Teacher Quality program to ensure that these activities continue throughout 2010-2011.

Our largest enrichment program, Girls Excel in Mathematics (GEM) continued its growth this year. Over 275 girls in grades 4-6 came to the department four times, supported by funds from the Center for Energy and Environment. Students in GEM this year learned about tessellations, origami, sphere packing, and pi. MathCEP has another 200 elementary and middle school students enrolled in similar Saturday morning mathematics enrichment programs which are open to the public.

Welcome to Incoming Faculty

ANAR AKHMEDOV

Anar Akhmedov was born in Azerbaijan ("land of fire") and grew up in Baku. He comes from a family of mathematicians - his brother is a math Ph.D. (a student of Margulis at Yale, now at NDSU) and his mother is also a mathematician (in Baku). Anar finished high school in Baku in 1994. While in high school he won the bronze medal in the international math Olympiad in 1993 in Istanbul, and also won the "Quantum" Mathematical contest of the Russian Academy of Science for high school students in the (former) USSR in 1992-94. After 1994 this contest, along with the old Soviet Union and the opportunity for bright students in the former republics to attend Moscow State University, ceased to exist. So Anar studied at Baku State University for a couple of years and then made (in part at his brother's instigation) the big leap to California, where he finished his undergrad work in 2000 at Cal State Fresno. When he came to California he had for a time real financial hardship, and the American system of many required courses outside of the major was also difficult to handle. Fortunately he found a great undergrad advisor, Hugo Sun, in the math department. Sun encouraged him in his graduate school ambitions and influenced his choice of U.C.-Irvine for graduate school. In his undergraduate years, Anar's chief interest was in number theory, especially elliptic curves.

Anar went on to get his Ph.D. at U.C.-Irvine, finishing in 2006. His advisor was Ronald J. Stern. The title of his thesis was "Exotic smooth structures on 4-manifolds with small Euler characteristic". In his thesis and in later work he constructed (countably) many differentiable structures on small blow-ups of the complex projective plane using techniques of knot surgery and rational blow-down, along with Donaldson and Seiberg-Witten invariants to distinguish smooth structures. The work was subsequently published in *Inventiones* in 2008. As a graduate student he spent one year at Princeton as a visitor, and also one semester at U.C.-Berkeley. He did not entirely forget about his interest in elliptic curves - he took a reading course from Karl Rubin when the latter arrived at Irvine in 2005.

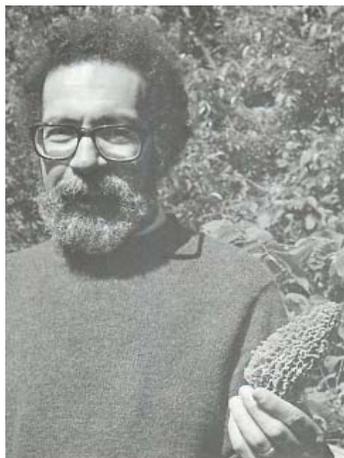
After Irvine, he was a postdoc at Georgia Tech 2006-2008, and worked there with John Etnyre. He was a visiting assistant professor at University of Zurich, spring-summer 2008 and worked there with C. Okonek. In fall 2008 he started a Ritt Assistant Professorship at Columbia, potentially to have lasted until 2011, but decided to come to Minnesota in fall 2009 after one year.

He is married and has two children, a daughter (4 years old) and a son (6 months old). He is a big soccer fan (Barcelona) and basketball fan (Lakers).

Featured Colleagues

Don Aronson

Prof. Don Aronson was born in Jersey City, N.J. in 1929 and attended public schools there. In high school, along with the usual mediocre instruction, he had the good fortune of having three outstanding mathematics teachers and a very good chemistry teacher.



Upon finishing high school he went on to MIT. His initial intent was to study electrical engineering, but he was defeated by the labs. After a very brief flirtation with physics (thermodynamics turned him off) he finally settled on mathematics. When he consulted the math department's undergraduate advisor, Henry Wallman, about switching into mathematics, Wallman

looked him up and down and remarked "you don't look like someone who wants to starve". At MIT he took courses from Hurewicz, Levinson, Lin, and Struik. Among the most remarkable courses he took was one on harmonic analysis from Raphael Salem (who was dividing his time between MIT and Paris) and a PDE course from Jim Serrin (who was a Moore instructor). He also audited a PDE course given by Hans Lewy at Harvard. Don attempted to take a course from Norbert Wiener, but one lecture was enough to convince him that it was not for him.

As an undergraduate, Don became very interested in numerical analysis under the influence of the astronomer Zdenek Kopal who was in the electrical engineering department. This led to Don working as a hand computer in Kopal's lab and subsequently as an undergraduate and graduate research assistant on Project Whirlwind (the MIT digital computer).

There was nobody in the MIT math department who could supervise a dissertation in numerical analysis, so Don became a student of Norman Levinson and wrote his dissertation on a singular perturbation problem in PDE. He was also mentored by Jim Serrin during that period. Levinson had been Wiener's student and Wiener always came to the oral examinations of Levinson's students. Being the most senior person in the room he was always given first crack at the candidate. At Don's exam Wiener started out with some questions about his own work on capacity and the Dirichlet problem which, thanks to Jim Serrin, Don knew. Wiener then asked a question about the Cauchy-Kowalesky theorem which had about twenty valid answers. None of the answers Don came up with satisfied Wiener and after a while the committee became restless and contributed additional answers. Still none of these satisfied Wiener and finally Levinson induced him to disclose what he had in mind. After that Wiener fell asleep. That in itself was harmless, but being asthmatic, he wheezed loudly so that the remainder of the exam was conducted at a shout.

After finishing at MIT, Don took a position as a research associate at the Digital Computer Laboratory of the University of Illinois. Life at the computer lab and in the twin cities of Champaign-Urbana did not sit well with Don or his wife Claire so they were delighted to receive an offer from Stefan Warschawski to switch twin cities and join the Institute of Technology Mathematics Department at the University of Minnesota.

Coming to Minnesota, Don became part of the golden age of PDE's here. He overlapped with Paul Rosenbloom, Art Milgram, Jim Serrin, Hans Weinberger, Johannes Nitsche, Gene Calabi, H. Yamabe, etc. Milgram was an extraordinary mentor. His office was a full-time seminar; he knew all of the current developments in PDE's. Don says that he "learned more from Art than from any other single person". It was a great shock when Milgram died of a heart attack in 1964. Don was here through the merger of the two math departments (I.T. and S.L.A.). It resulted in a single school of mathematics in 1963, originally under the headship of Neal Amundsen, of chemical engineering, with Leon Green as associate head (and de facto head) of the School of Mathematics. When the school moved into Vincent Hall, the administrative offices of the Department of Mortuary Sciences were still in the south end of the first floor of Vincent Hall. Don (with the collaboration of Hans Othmer and Rutherford Aris) produced an elegant sign which said "rigor mortis". Next to rigor was an arrow pointing towards the math offices, and next to mortis an arrow pointing to mortuary science.

It would be hard to summarize here all of Don's collaborations over the years, but at least one example has to be mentioned. In 1974 and 1975, Don and Hans Weinberger wrote two papers on traveling wave solutions to scalar reaction diffusion equations which arise in population genetics, combustion theory and nerve pulse propagation, papers which are still referenced to this day. The work was inspired by R. A. Fisher's paper on the wave of advance of advantageous genes and the paper of Kolmogorov, Petrovskii and Piscunov, both published in 1937.

Don is currently Director of Postdoctoral Programs at the IMA. He had earlier a temporary stint as director of graduate studies, and served for a year as department grievance officer. He is particularly proud of his student David Terman at Ohio State. All in all, Don has had a rich and rewarding career at Minnesota.

Donald Kahn

It was a special pleasure to interview our colleague Donald Kahn for this newsletter, since he has played a leading role in developing articles about other distinguished members of our department. Now, with typical modesty and grace, he has finally and reluctantly allowed us to turn the tables, and make him the subject.

Don is a child of New York, born in a small hospital known as Leroy Sanatorium, where his mother's cousin was on staff. His education began at Woodmere Academy, a fine private school. Since his mother had a Ph.D. in psychology from Columbia, and her thesis adviser was a counselor at Woodmere, it was a natural choice. But after Pearl Harbor brought gasoline rationing, the length of the commute led to a transfer to a public school, P.S. 114 in Queens. This was



a typical city school with lots of tough kids, definitely a new environment, but Don soon made friends with the toughest kid in the school, and managed to survive, until the war ended, when he moved back to Woodmere.

After graduation, Don's undergraduate education took place at Cornell, which was something of a tradition for Don's extended family. He initially thought in terms of a physics major, and took Hans Bethe's quantum mechanics course. Bethe was a very impressive scientist, who eventually was awarded the Nobel Prize. He was also a fearless calculator, who needed no notes for lectures and had many powerful mathematical tools in his head. But he seemed to have a rather hostile view of mathematics as a discipline, and ruthlessly trampled on some of the subtleties of math that Don was already able to savor. So in the end he turned away from the dark side of the force, and became a math major.

Don also met his future wife Phyllis at Cornell, and they graduated in the same year. Though they were from very different places (Don was from Queens and Phyllis from Brooklyn), they hit it off and were married while still at Cornell. Phyllis went on to do her Ph.D. in biophysics, and has served with great distinction since the 1970's as a member of the Minnesota House of Representatives. After Cornell, both Don and Phyllis did their graduate study at Yale. They also managed to fit in a year at MIT, where they both got NSF Fellowships.

At Yale, Don had the chance to learn from many outstanding mathematicians, and did his Ph.D. thesis in topology with William Massey. One of the benefits of study at Yale was that mathematicians at several East Coast universities (such as Brown and Harvard) frequently visited and attended each other's seminars, enriching the mathematical environment at all these schools. Thus Don had already heard Bill Massey lecture and had visited him at Brown before Massey moved to Yale and was able to serve as Don's thesis advisor. Don's thesis was in algebraic topology, and dealt with cohomology with real coefficients, an area which saw a lot of subsequent development after Don's fundamental work. (A little later the study of real and rational cohomology received a big boost with the work of Dennis Sullivan on minimal models.) Don got his Ph.D. in 1961, when Phyllis still had a year to go on her thesis, perhaps illustrating the vicissitudes of experimental biology. So Don took a Ritt Instructorship at Columbia and commuted from New Haven to New York. After Phyllis finished and went to Princeton as a postdoc, Don continued to commute, though now from Princeton. Columbia was immensely stimulating for Don. It seemed as if everyone in the mathematical world was either there or passing through, giving seminars and coming to lunch. Don's own interests in algebraic topology were expanding at this time, so this was a very creative period for him.

In Fall 1964, Don and Phyllis came to Minnesota, though Don also spent two terms that year at Heidelberg visiting Albrecht Dold. This was a period of great activity and change at Minnesota, shortly after the merger of the two mathematics departments, one of which was in the Institute of Technology and the other in what is now the College of Liberal Arts (CLA). A chemical engineer (Neal Amundson) was temporarily head of the department, though the actual running of the department was in the hands of Leon Green. Eugenio Calabi was then one of the outstanding senior people in the department, but left the same year that Don arrived. And as we have noted in other articles, there were

many younger folks who would carry on the tradition of mathematics at Minnesota (including Don Aronson, Leon Green, Larry Markus, Jim Serrin and Hans Weinberger).

Throughout his career, Don has been a devoted supporter of both undergraduate and graduate instruction here at Minnesota. He is author of two textbooks, one on topology and one on global analysis, and has served twice as Director of Graduate Studies. Don also developed a televised calculus course with a textbook, as part of a University of Minnesota project, later sold to a private educational company. Nine students have completed Ph.D.s under his direction, and Don is often to be seen leading informal graduate seminars in topological subjects.

We asked Don about what he thought of the present state of graduate study in math, since currently we seem to be short of money for support, and have fewer students than in earlier years. He mentioned that as a grad student at Yale his NSF Fellowship salary was \$1500 per year. Fortunately Phyllis had one also. Don has seen ups and downs in conditions, as well as changes in the emphasis on fields. Overall, from his relatively long view he remains optimistic about the future of graduate education in mathematics.

Don has traveled extensively, and is keenly interested in the literature and music of France and Latin America. In his travels, as well as attending conferences and meeting with researchers, he has taken the opportunity to talk with educators, and see how advanced mathematics is taught in their countries. Throughout the years he has also enthusiastically followed Phyllis's career and her achievements in the political field, particularly dealing with health, education and women's rights. Don is also an outstanding photographer, who has had many public showings of his own work. It should be noted that he has generously served as math department photographer for many years. His perceptive images form an invaluable record of the people and moments of an era.

Now Don is moving toward a well-deserved retirement. Phyllis still has goals she would like to achieve in her work in the state legislature, and this gives us hope that she and Don will keep Minnesota as a base. At the same time Don has deep ties to New York City, and he enjoys visiting his son and family in Montreal. Wherever his travels take him, we are sure that he will remain an active Renaissance man and mathematician. And wherever he and Phyllis go, our best wishes will go with them.

Harvey Keynes

Harvey Keynes grew up in Philadelphia. He attended Central High School, a city-wide academic magnet school. It was the heyday of public education, and the school created opportunities for bright students. The graduates included Noam Chomsky. Harvey's father, an immigrant who eventually earned a PhD in Russian literature, taught at Central High. After high school, Harvey went to MIT as a math major and then got a master's degree at the University of Pennsylvania. He remembers the proseminar (high-powered problem-solving sessions), where problems were set by Besicovitch, Grosswald and Rademacher. For his doctoral studies, Harvey went to Wesleyan, following his advisor, Walter Gottschalk. He studied with Bob Ellis (who later moved to



Minnesota) and Saturnino “Joe” Salas who had collaborated with Einar Hille on a famous calculus text. Harvey was the first PhD in the newly created program at Wesleyan. He was supported by NSF (National Science Foundation) and Woodrow Wilson fellowships.

After getting his Ph.D. in 1966, he went to the University of California at Santa Barbara for 2 years before coming to Minnesota. Studying problems in topological dynamics with Bob Ellis, he got a regular appointment in 1969, when Hans Weinberger was department head. It was an exciting time in dynamical systems - Steve Smale, Rufus Bowen and Harry (Hillel) Furstenberg were very active. A summer conference at Warwick in 1969 brought Harvey into contact with many of his future co-authors, from around the world. For example, one notable co-author, Michael Sears, from South Africa, was at that time based in Adelaide, Australia where he had emigrated during the apartheid era. (Sears later returned to South Africa after apartheid ended, where he became a professor of computer science at the University of Witwatersrand; now in retirement he is part of a two-man crime-writing team working under the pseudonym Michael Stanley.) After a sabbatical at Berkeley 1978-79, he accepted the invitation of Willard Miller to be the associate head of the school of mathematics. During 1982-83 he spent a year as program director in modern analysis at the NSF. Robert Hardt (the teacher of Fanghua Lin) then followed him as associate head.

In the late 70’s, Wayne Roberts and Macalester College hosted a program to identify bright students and put them into an enriched program. The math department was asked to create a calculus course in 1980 and wound up hosting the entire program. Harvey and Jay Goldman, with the support of then head, Willard Miller, created a suitable 3-year calculus course. With the need for an enriched high school program, UMTYMP came into being. Instructors for the initial group also included high school teachers and TA’s. Our colleague Mark Keel was a distinguished graduate of the first calculus class. Beginning in 1983, UMTYMP received a “state special” - an independent appropriation which remarkably continues to this day. The UMTYMP program continues to have great recognition, especially in the legislature. The program also benefited from a substantial NSF grant to run professional development programs for high school teachers, and a Bush Foundation grant to promote gender equality. (A former Miss Minnesota, also an accomplished viola player, is an UMTYMP graduate). Sadly, the opportunities for bright students beyond the Twin Cities area seem to be diminishing, and the only outstate program of this sort which remains to this day is in Rochester. But the success is beyond doubt. Of the current UMTYMP grads, the chance of being admitted to a top university is 55% (and even if you discount the extremely high admission rate into the University of Minnesota, it is an impressive 42%). Harvey’s efforts will be felt far into the future.

Peter Webb

Our colleague, Prof. Peter Webb, was born in Ibadan, Nigeria. His father had gone there to found the zoology department at the university. Nigeria was then a British colony, and Peter and his family remained there until Nigerian independence in 1960 (although his two older brothers had already been sent back to boarding school in England), at which time they moved to north London. His father became chair of the zoology department of Westfield College

(University of London) and remained in this position until his retirement. Peter went to high school at University College School and is proud that this school was founded on progressive, secular and egalitarian principles, at a time in the 19th century when education in England was to a large extent associated with the church. After that he went to St. John’s College, Cambridge, reading mathematics.

Peter’s experience of the English educational system left him with a number of ideas about the role of competition in the way he was taught, and in education more generally. For the students who can respond to it, it works well, but the cost is that it may produce excessive tension in their lives. For many, it may not work at all. At school, and also at Cambridge, Peter was judged by one set of exams taken at the end of each year. At school this was tolerable, but at Cambridge the stakes seemed higher and Peter remembers totally sleepless nights before some of these exams.

Peter’s teachers at Cambridge included some rather famous mathematicians, including Frank Adams, John Conway and John Thompson among others. He remembers at one time attending a seminar on Lie theory attended by both Frank Adams and Stephen Hawking (who was not one of Peter’s teachers). During the seminar Hawking repeatedly asked technical questions which were answered by Adams, and one can only guess at the theory which potentially was taking shape in Hawking’s mind.

After Cambridge, he went to Queen Mary College of the University of London where he was fortunate to have Karl Gruenberg as his adviser. Karl Gruenberg was a former student of Philip Hall who had earlier come to England when he was a boy as a refugee from Austria. Gruenberg was an excellent Ph.D., adviser, and one quality which Peter particularly remembers is that he was very sociable and invariably introduced his students to the mathematical visitors who passed through. This awareness of the importance of such connections gave Peter the opportunity to begin professional relationships that continue to this day. After finishing his doctoral degree, he went to Girton College, Cambridge, before becoming a lecturer at Manchester University (1981-1988). At the end of this period he had the honor of sharing the Junior Whitehead Prize of the London Mathematical Society with Andrew Wiles and Mary Rees (who had been here at Minnesota and is now a Fellow of the Royal Society).

After some visiting appointments, including at the University of Oregon, he joined our department in 1989. Peter lives with his wife, Karen Saxe (currently head of the mathematics department at Macalester College), and their 3 children, in Northfield, where they find the social and cultural life much to their liking.

Music has always been an important part of Peter’s life. He started piano at 6 and has been performing in various contexts since about the age of 10. He particularly remembers from his school years performing the first movement of Beethoven’s first concerto with the school orchestra, and a Handel organ concerto again with the school orchestra. Outside school he was introduced to the music of Benjamin Britten when he played the organ in a performance of Noyes Fludde, and Britten has



been a favorite composer ever since. More recently Peter has been studying jazz and he is a founding member of a group called Sweet Jazz which focuses on the standard vocal repertoire, performing mainly in the Northfield area. For a long time Peter has also been enthusiastic about the theater. He has played piano and been music director for several shows with the Northfield Arts Guild, and he also has several nonmusical roles to his credit. He is particularly excited to be playing the role of the elder mathematician in the Northfield Arts Guild production of 'Proof', which will open in April 2010.

Symposia

Midwest Topology Seminar

The Midwest Topology Seminar occurs two to three times yearly to discuss new research developments. On May 2-3, 2009, the University of Minnesota hosted the Midwest Topology Seminar. The speakers and the titles of their lectures were: Clark Barwick (Harvard), "Operator Categories and Homotopy Coherent Algebra", Charles Rezk



(University of Illinois at Urbana-Champaign), "Power operations in Morava E-theory", William Dwyer

(University of Notre Dame), "Long knots and operad maps", Victor Turchin (Kansas State University), "Embedding spaces and the operad of little cubes", Teena Gerhardt (Indiana University, Bloomington), "Algebraic K-theory of the dual numbers", and John Klein (Wayne State University) "Periodicity and Duality".

Support for the seminar was provided by the National Science Foundation.

Riviere-Fabes Symposium

The department hosted the twelfth Riviere-Fabes Symposium on Analysis and PDE on April 17-19, 2009. Well over 80 people participated in the symposium, including a large number of young people from both within and without our department.

The main lecturers (each delivering two one-hour talks) were Professors Ermanno Lanconelli and Cedric Villani (from Universita di Bologna and Ecole Normale Superieure de Lyon, respectively). One-hour talks were delivered by Ioan Bejenaru (University of Chicago), Hongjie Dong (Brown University, a graduate of the University of Minnesota), Thierry Gallay (Universite de Grenoble), and Alexis Vasseur (University of Texas).

A full schedule, abstracts of the talks, and photos from the event taken by the inestimable Professor Don Kahn (with camera in hand and with equal ease, he commands a gaggle of groggy eyed analysts to brighten, smile, and say "cheese", or disappears like a potted plant to take photos at the reception) can be found at the workshop website,

http://www.math.umn.edu/conferences/riv_fabes_09_rf2009_pictures/

The Twelfth Riviere-Fabes Symposium was supported financially by the department's Riviere-Fabes fund, by a grant from the National Science Foundation, and by a grant from the Institute for Mathematics and its Applications (IMA).

Awards and Recognition

Kathrin Bringmann

Assistant Professor [Kathrin Bringmann](#) has been awarded the [2009 SASTRA Ramanujan Prize](#), which was awarded in December at SASTRA University in Kumbakonam, India, Ramanujan's hometown. [Kathrin Bringmann](#) was also awarded the prestigious [Krupp Prize](#) for Young Professors. The one million Euro prize, for a five-year period, is awarded by the Alfried Krupp von Bohlen und Halbach Foundation. Kathrin's research area is in number theory and combinatorics, and she is only the third mathematician to win the annual prize since its inception in 1986.

Tyler Lawson

Assistant Professor [Tyler Lawson](#), was awarded a prestigious [Sloan Research Fellowship](#) for 2010-2012. The Sloan award is "... to stimulate fundamental research by early-career scientists and scholars of outstanding promise." Tyler's research specialty is algebraic topology and K-theory.

Marta Lewicka

Assistant Professor [Marta Lewicka](#) was awarded a five year Career grant award from NSF. The [Faculty Early Career Development \(CAREER\) Program](#) represents "...the National Science Foundation's most prestigious awards in support of junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education and the integration of education and research within the context of the mission of their organizations." Marta's research area is analysis and applications of partial differential equations.

Yoichiro Mori

Assistant Professor [Yoichiro Mori](#) was awarded a [McKnight Land-Grant Professorship](#) during 2010-12. This University of Minnesota award is in recognition of a junior faculty member's outstanding contributions to research and potential for future achievements. The award provides a research grant over two years, summer support, and a research leave during the second year. Yoichiro's research project is in mathematical biology, and titled "A Three-Dimensional Model of Cellular Electrical Activity with Applications to Heart and Brain Physiology".

Duane Nykamp

Assistant Professor [Duane Nykamp](#) was promoted to Associate Professor with tenure. Duane's research area is mathematical neuroscience.

Fadil Santosa

Professor [Fadil Santosa](#) has been named a [SIAM Fellow](#) "for contributions to the mathematics of inverse problems and for advancing the application of mathematics in industry". The Society for Industrial and Applied Mathematics ([SIAM](#)) is the premier international organization devoted to applied mathematics and computational science.

Master of Financial Mathematics (MFM)



First MFM Class Held at the University of Minnesota

Our Master of Financial Mathematics (MFM) program improves every year and has become one of the focal points of the finance community in the Twin Cities area. Applications are up this year over last, by a factor of 2, and, as of this writing (25 February), we have 163 applicants, which sets a record (the previous record being 149), with several months left to go in the recruitment season (which ends on 5 June).

Now in our third year of operation, we are starting to stabilize in size with about 100 students (our count is 111, as of this writing) resulting in significant revenue, though our tuition is very low, compared to other professional programs. (Our class sizes, however, are somewhat large, with several of them at 40-45 students.)

The biggest problem we face is the continuing difficult job market in finance. Carme Calderer, as MCIM Director, has been working hard to try to find our students internships and job placements. The good news is that, for the first time in many months, we are fielding regular requests from companies for our students.

A number of improvements are being made in the program. In particular, we will be offering four of our MFM courses by distance, starting Fall 2010. Moreover, the Board of Regents recently approved our proposal to offer these four courses as a 12-credit post-baccalaureate certificate, Fundamentals of Quantitative Finance (FQF). Also, for the first time this year, we offered students the chance to participate in a workshop in financial mathematical modeling, similar to workshops jointly offered for many years by the IMA and MCIM. This workshop ran 7-16 January 2010, with 20 students and 3 mentors. The IMA offered some of its space and the School of Mathematics offered partial funding, with the remainder made up in a workshop fee assessed on the participating students. We intend to offer this workshop again next year.

We also have some longer range plans, including a spring quant job fair, a financial engineering program and increased collaboration with the Carlson School of Management.

IMA News

The Annual Program for 2009-2010 is on Complex Fluids and Complex Flows. This program is broadly concerned with fundamental challenges of modeling, analysis and computation for fluid dynamics. One focus of the program

is the study of non-Newtonian fluids in which complex material constitutions produce nonlinear and nonlocal relationships between stresses and rates-of-strain, leading to unique and often unforeseen flow phenomena. These fluids are ubiquitous in engineering applications and the applied sciences from biology to geology. Another focus is the analysis of flows in the presence of moving boundaries, such as animal locomotion, and flows involving turbulent mixing. During this program, the IMA is hosting an unprecedented number of long-term visitors. A total of ten postdoctoral fellows were appointed for this program, and an additional four industrial postdoctoral fellows were hired.

On September 22, 2009, the IMA held its inaugural Arnold Family Lecture. The lecture series has been made possible by a generous donation by the Arnold family, that includes our colleagues Doug Arnold and Carme Calderer. The speaker was Professor Donald Saari from University of California, Irvine, who gave a fascinating presentation on the mathematics of voting.

A three-week Summer Program on “Nonlinear Conservation Laws and Applications” was co-organized by our colleague Marta Lewicka, along with Alberto Bressan (Penn State), Gui-Qiang Chen (Northwestern), and Dehua Wang (U. of Pittsburgh). The program hosted about 120 participants, while many other mathematicians, whose applications had to be declined due to space limitation, followed the lectures and discussions via the IMA live streaming.

The first week was largely devoted to tutorial sessions and general survey lectures, targeted at young researchers and Ph.D. students. The second week focused more on the theoretical aspects, and the third week on applications and numerical methods. The program received overwhelmingly positive feedback. Discussions continued afterwards in the form of open letters circulated within the community, and a volume of the IMA proceedings is under preparation.

Next summer’s activities include the Math Modeling in Industry workshop and Interdisciplinary Research Experience for Undergraduates. The Math Modeling workshop is a joint effort with Centro de Investigacion en Matematicas (Mexico) and the Pacific Institute for the Mathematical Sciences (Canada), and will take place in Guanajuato, Mexico.

Remembering Former Colleagues

Leon Green

We are sad to report that our colleague and friend Leon Green passed away this past summer at the age of 83 years. Leon was born in Passaic, New Jersey. During World War II he trained with the U.S. Coast Guard. After the war, he completed his B.A. degree at Harvard. He had some remarkable teachers there; for example, Henri Cartan, visiting from Paris, taught Leon complex variables. Leon then went to graduate school at Yale, where his thesis adviser was G. A. Hedlund (who in turn was a student of Marston Morse). After a year at Princeton, Leon came to Minnesota, where he became a full professor in 1963. He also had extended mathematical visits in Paris and at Yale. Leon’s interests included dynamical systems and differential geometry. Perhaps the most famous of his 28 published papers is “Auf Wiedersehensflächen” in the *Annals of Mathematics* (1963), which is written in English, even though MathSciNet lists it as being in German. The title is a marvelous pun. Blaschke had

introduced the concept of Wiedersehensflächen, or “see-you-again surfaces”. These are surfaces in which two geodesics leaving any point would meet at a second point of the surface. Leon proved in this paper that the only such surfaces were round spheres, and therefore “bye-bye” to the whole concept!

Leon had seven Ph.D. students, including Nathaniel Grossman who had a prominent career at U.C.L.A. Leon played a key role in the formation of the School of Mathematics as we now know it. Prior to 1963, there were two mathematics departments, one in the College of Engineering and one in Science and Liberal Arts. When the administration agreed to unite the departments, Prof. Neal Amundson, from Chemical Engineering, was chosen to be the Head, making Leon the Associate Head. Amundson played the role of a general overseer, while Leon ran the show. He never really enjoyed administration, and was succeeded by Jim Serrin. In cooperation with others, Leon brought distinguished visitors, such as Andre Avez and Marcel Berger, to the School. He continued to serve the department and the differential geometry program here over many years.

He will be greatly missed.

Warren Loud

Warren Simms Loud was a distinguished member of the School of Mathematics, and a recognized researcher in the field of nonlinear ordinary differential equations. As an undergraduate at M.I.T., he was a Putnam Exam winner in 1942. He continued his graduate studies at M.I.T., receiving his Ph.D. degree in mathematics in 1946 as a student of Norman Levinson.

After working at research laboratories at M.I.T. both before and after his doctorate, Warren joined the faculty of the Mathematics Department of the College of Science, Literature and Arts in 1947 as an assistant professor. He spent the rest of his career at Minnesota, being promoted to associate professor in 1956 and shortly thereafter to full professor in 1959. He was one of the prime movers in bringing about the unification in 1963 of the two separate mathematics departments. He served on a number of committees of the Graduate School, including chairing the Physical Sciences Group Committee. In addition he served on the first council for Liberal Education, the IT Honors Committee, and the University Parking and Transportation Committee. After many years of dedicated teaching and service, Warren retired in 1992.

Warren's research led to numerous publications along with invitations to speak at conferences throughout the world. He enjoyed three overseas sabbaticals, in Germany, Japan and Italy. He served as the advisor of eight Ph.D. students. He was awarded the Outstanding Teaching Award in 1979.

In addition to his University career, for almost 30 years, Warren sang and acted in many productions of the Gilbert & Sullivan Very Light Opera Company in Minneapolis - most recently in "The Mikado" in 2007 - before declining health forced him off the stage. He also was a choir member for 44 years at the Plymouth Congregational Church in south Minneapolis, as well as serving on the church's boards of religious education, fine arts, and deacons.

He will be missed by his colleagues and friends here in Minnesota.

Marian Boykan Pour-El

Marian Boykan Pour-El was a distinguished member of the School of Mathematics, and an internationally renowned researcher in logic and its applications. She received her Ph.D. from Harvard in 1958, was Assistant and Associate Professor of Mathematics at Penn State. She was a visitor for two years at the Institute for Advanced Study in Princeton, where she worked with Kurt Gödel. She came to the University of Minnesota in 1964, and was promoted to full Professor in 1968. She was very active in departmental affairs, teaching, mentoring and research throughout her long career until her retirement in 2000.

Marian was an active and innovative researcher in the field of logic, specializing in computability. Her most famous and surprising result, written with J. Ian Richards, a fellow Minnesota professor, showed that there exists computable initial data for the wave equation so that the corresponding unique solution is not computable. Their work on computability of differential equations, eigenvalue problems and physics led to a jointly authored book, “Computability in analysis and physics”, which had a major impact on the field and throughout mathematics. She delivered invited addresses at high level mathematical meetings throughout the world, including Europe, the former Soviet Union, China and Japan.

Marian was the subject of an in depth profile in the 1997 book “Women in Mathematics”, by Claudia Henrion, which detailed the lives and challenges faced by the pioneering women in the field. The stories of her isolation and determination in the face of being the only female in an all male department, her choice of logic as a field of research despite there being no logicians at Harvard, which required her to go to Berkeley to finish her thesis, and her balancing of marriage, children and research career, makes for fascinating reading and gives remarkable personal insight into the barriers that pioneering women mathematicians and scientists had to overcome in the not so distant past. In those days, while there were precious few women mathematician role models for her to emulate, there were literally none that were also married and raising a family. So Marian was a one-of-a-kind, and a true inspiration to all those who came after.

She will be sorely missed by her colleagues here in Minnesota and her many friends and collaborators worldwide.

Finally, we note that there will be a Special Tribute to Marian Pour-El organized by Ning Zhong at the conference Computability in Europe 2010: Programs, Proofs, Processes, Ponta Delgada (Azores), Portugal, June 30 to July 4, 2010, (<http://www.cie2010.uac.pt/>).

Edgar Reich

When Edgar arrived in Brooklyn with his family to escape the developing holocaust, he was 11 years old. After graduating from Brooklyn PolyTech as an Electrical Engineer at age 20, he went to MIT as a Research Assistant in the Servomechanisms Lab. In the Lab he worked on numerical methods and discovered a still widely used improvement of the Gauss-Seidel iterative method for solving linear equations. Next, at age 22, he accepted a position at the Electronics Division of Rand, working mainly on queuing theory. He worked there full time until 1956, in the meanwhile getting a PhD at UCLA and a leave of two years at the Institute for Advanced Study in Princeton. Steve Warshawski recruited Edgar to Minnesota in 1956 where he remained in the School of Mathematics for 44 years until his retirement in 2000 at

age 73. Edgar's career at Minnesota was as the consummate complex analyst.

Beginning in 1960, he became interested in the emerging theory of quasiconformal mappings of regions in the plane. The theory had been initiated by Teichmüller in the 30s and brought to rigorous status by Ahlfors in the 50s. Edgar was one of the pioneers in its development. He gained particular expertise in extremal and unique extremal mappings of the unit disk and became the worldwide leader in this important aspect of the theory. Perhaps the highpoint of his work was the Reich-Strebel inequalities, which have turned out to be fundamental in understanding the deformation of complex structures on Riemann surfaces. His work in a different aspect of the field led to the Gehring-Reich conjecture on the distortion of area under quasiconformal mappings. This was finally solved by Kari Astala who received the Salem prize for his accomplishment. The Finnish Academy of Science elected Edgar to membership in 1980. Edgar had 5 PhD students (D. Goodman, T. Reed, G. Schwartz, A. Sontag, H. Walczak), brought to Minnesota 4 assistant professors (Richards, Marden, Kelingos, Agard), and mentored 2 postdocs (Fehlmann, Markovic). Edgar was the first outsider to recognize Markovic's brilliance in the field and played a key role in launching his career; he is today an international star. Although Edgar was Head of Department 1969-71, he really eschewed administration of any kind. However, he was devoted to the math library and assisted in maintaining its health and location over many years. Edgar's first wife, Phyllis (Masten) died in 1994. They are survived by two children and five grandchildren: Eugene Reich (Leah, Gabriel, Abigail) of Crystal, and Frances Rabe (Matthew, Andrew) of Inver Grove Heights. Edgar married Julia Henop of Bregenz, Austria in 1998. She died in 2006. Edgar loved to hike with family, friends, and by himself in the Swiss mountains. His ashes, together with those of Phyllis and Julia, are scattered by Seelapsee.

Edgar's scholarship went well beyond mathematics to European history, world geography and languages. He was a stickler for precision and detail, as much in daily life as in mathematics. Edgar's singular personality, character, and depth of knowledge was much appreciated by friends and colleagues worldwide. His premature death is a great loss to our department.

"We thank Al Marden for supplying this article, which is printed in full."

Minnesota Center for Industrial Mathematics (MCIM)

The Minnesota Center for Industrial Mathematics sponsors the "industrial problems" seminar series, featuring mathematicians and scientists working in non-academic organizations. The goal of the seminars is to help students and faculty members get acquainted with the mathematical problems and scientific challenges that researchers in companies and national laboratories deal with in their work.

Recent seminars include speakers from Medtronic, Inc., Schlumberger and Doll Research, General Motors, 3M, Whitbox Advisers, Merck & Co, Boston Scientific, Starkey Labs, BMC Vision Ease, Sandia National Laboratories, the National Institute of Standards and Technology and NASA

Langley Research. Some of these companies have also sponsored Ph.D. students for summer internships.

A common theme shared by most of the lectures is the role of mathematics in the different stages of an industrial process, ranging from early modeling of a device or process, analysis of the ensuing equations, study of the numerical tools used in simulations, and product design and development. Specific examples include evaluation of potential oil reservoirs and optimization tools to model environmentally safe approaches to bring hydrocarbons to the surface, performance analysis of biomedical devices in order to avoid failure, portfolio management, and control and optimization of transport systems.

Math Library News

The Mathematics Library is a busy place during the semester: people visited over 80,000 times in 2009, according to the automatic exit counter; that's 10% more than the previous year. Students find it an attractive place to study, as may be seen any February afternoon, but people also got help with a few thousand reference questions and checked out books and journals 21,000 times, up 4% for the year. Of course the online resources (from <http://math.lib.umn.edu>) are heavily used too, e-journal subscriptions perhaps most of all! E-books are a growth area, the library having invested in online books from Springer (9,000 uses of math titles), CRC Press, and other publishers. The locally-produced library webpages for 1000- and 2000-level courses were used over 17,000 times. MathSciNet is the most popular math resource, with close to 100,000 queries in an average year.

These statistics give a broad indication of the demand for the library's various resources and services, but they can't completely capture its role within the School of Mathematics. It was an honor for the library to provide the setting for the November faculty memorial service, and an exhibit highlighting the honorees' achievements was displayed throughout the fall. It featured photographs of them as well as books and journal articles they had written; the background poster "Remembering Recently Departed Professors" may be viewed at <http://math.lib.umn.edu/exhibits/Remembering.pptx>.

The Mathematics Library anticipates a stable budget to maintain in-person and technology-enabled support of math research, teaching and learning.

Retirements

Kathleen Houser

Kathleen (Kate) Houser, School of Mathematics Principal Accountant, retired in September 2009 after 32 years dedicated service. Kate played many essential roles—in accounting, in grant administration and helping the department function smoothly over the years. Kate will be missed and we wish her the very best for the next phase of her life.

Kathleen Swedell

After 33 years of dedicated service to the School of Mathematics, Kathleen (Kathy) Swedell decided to retire in October 2009. Her essential role as an Executive Accounts Specialist was that of running the Department Visitors' and Travel Program. She performed her job with a great deal of pride, professionalism and with a smile. Kathy was quite a favorite with the faculty and visitors. She will be missed and all of our best wishes go with her.

Undergraduate Program

From the Director of Undergraduate Studies

2010 Barry M. Goldwater Scholars

The School of Mathematics congratulates the following Mathematics Undergraduate sophomores who have been named 2010 Barry M. Goldwater Scholars:

Grant Remmen, IT Astrophysics, Physics and Mathematics

Graduate Program

Graduate Student Fellowship Awards

Richard McGehee, Director of Graduate Studies in Mathematics and The Graduate School congratulates the following graduate students who received fellowships.

Kevin Dilks, First Year Graduate School Fellowship and NSF (National Science Foundation) Graduate Research Fellowship, Paul Garrett, advisor.

Thomas McConville, First Year Graduate School Fellowship, Paul Garrett, advisor.

Catherine A. Micek, Doctoral Dissertation Fellowship, *Volume Transitions in Gels with Biomedical Applications: Finite Elements and Elasticity*, Carne Calderer, advisor.

Walter Rusin, Doctoral Dissertation Fellowship, *Minimal Blow-up Solutions for Navier-Stokes Equations in Critical Spaces*, Vladimir Sverak, advisor.

Zhang, Weiyi, Doctoral Dissertation Fellowship, *Symplectic Geometry through Complex Geometry*, Tian-Jun Li, advisor.

Ph.D. Graduating Students

Richard McGehee, Director of Graduate Studies in Mathematics and The Graduate School congratulate our recent graduating Ph.D. students (February, 2009 to February, 2010).

Michael G. Aschenbeck, *A Learning Approach to Detecting Lung Nodules in CT Images*, Fadir Santosa, advisor, Research Scientist, Geo Eye.

Jeremy c. Bellay, *The Stability and Transitions of Coherent Structures on Excitable and Oscillatory Media*, Arnd Scheel, advisor, Postdoctoral Associate, Institute of Technology, Computer Science & Engineering, University of Minnesota.

Andrew S. Berget, *Symmetries of Tensors*, Victor S. Reiner, advisor.

Joao Pedro Boavida, *Compact periods of Eisenstein Series of Orthogonal Groups of Rank One*, Paul B. Garrett.

Brandon M. Chaubaud, *Analysis and Numerics of the Mechanics of Gels*, Carne Calderer, advisor, Postdoctoral Researcher, Department of Mathematics, Pennsylvania State University.

Guangliang Chen, *Spectral Curvature Clustering for Hybrid Linear Modeling*, Gilad M. Lerman, advisor; Visiting Assistant Professor, Mathematics Department, Duke University.

Antoine Choffrut, *On the Local Structure of the Set of Steady-State Solutions to the 2D Euler Equations*, Vladimir Sverak, advisor; Visiting Postdoctoral Fellow, Hausdorff Center for Mathematics, University of Bonn.

Matthew D. Dobson, *Mathematical Foundations of the Quasicontinuum Multiscale Method*, Mitchell B. Luskin, advisor; Postdoc, CERMICS, Ecole Nationale des Ponts et Chaussees, France.

Josef G. Dorfmeister, *Relative Methods in Symplectic Topology*, Tian-Jun Li, advisor; Postdoctoral Researcher, RTG: Analysis, Geometry and Strings, Leibniz Universitaet Hannover, Germany.

Juraj Foldes, *Asymptotic Properties of Positive Solutions of Parabolic Equations and Cooperative Systems with Dirichlet Boundary Data*, Peter Polacik, advisor; Assistant Professor-Postdoc, Department of Mathematics, Vanderbilt University.

Alexander J. Hanhart, *Combinatorial Topological Field Theory*, Alexander A. Voronov, advisor; Clinical Assistant Professor, Courant Institute of Mathematical Sciences, New York University.

Jifeng Hu, *Mathematical Modeling and Analysis of In Vitro Actin Filament Dynamics and Cell Blebbing*, Hans G. Othmer, advisor; Postdoctoral Associate, Department of Mathematics, University of Minnesota.

Ryuhei Ichikawa, *Adjoint Recovery of Superconvergent Linear Functionals from Galerkin Approximations*, Bernardo Cockburn, advisor.

Joseph Kenney, *Evolution of Differential Invariant Signatures and Applications to Shape Recognition*, Peter J. Olver, advisor.

Delia D. Letang, *Subconvexity Bounds for Automorphic L-Functions on GL_2* , Paul B. Garrett, advisor.

Chin-Yueh Liu, *A Kinetic Theory Approach to Capturing Interneuronal Correlation in Feed-Forward Networks*, Duane Q. Nykamp, advisor; Assistant Professor, Department of Applied Mathematics, National University of Kaohsiung.

Jonathon R. Peterson, *Limiting Distributions and Large Deviations for Random Walks in Random Environments*, Ofer Zeitouni, advisor; NSF Postdoctoral Fellowship, University of Wisconsin - Madison, Madison, WI.

Sarah Isabelle M. Post, *Models of second-order superintegrable systems*, Willard Miller, Jr., advisor; Research Postdoc, University of Montreal, Canada.

Daniel E. Swenson, *The Steinberg Complex of an Arbitrary Finite Group in Arbitrary Positive Characteristic*, Peter Webb, advisor.

Vasfiye Hande Tuzel, *A Level Set Method for an Inverse Problem Arising in Photolithography*, Fadir Santosa, advisor; Assistant Professor, Worcester State College.

Francis Valiquette, *Applications of Moving Frames to Lie Pseudo-Groups*, Peter J. Olver, advisor; NSERC Postdoctoral Fellow, Department of Mathematics & Statistics, McGill University.

Jonathan T. Whitehouse, *Generalized Sines, Multiway Curvatures, and the Multiscale Geometry of d -Regular Measures*, Gilad M. Lerman, advisor; Postdoctoral Fellow, Department of Mathematics, Vanderbilt University.

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:

Peter Olver
olver@math.umn.edu
 Telephone: (612) 625-5591

Graduate Studies

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

Undergraduate Studies:

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

Master of Financial Mathematics:

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

Institute for Mathematics and its Applications (IMA)

Fadil Santosa, Director
 Markus Keel, Deputy Director
 Chun Liu, Associate Director
 Chehrzad Shakiban, Associate Director for Diversity
 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)

Maria Carme Calderer, Director
<http://www.math.umn.edu/mcim>
mcim@math.umn.edu
 Telephone: (612) 625-3377
 Fax: (612) 624-3333

**School of Mathematics Center for Educational Programs
(MathCEP)**

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

The Newsletter Committee is composed of Greg Anderson (Chair), John Baxter, Adrian Diaconu, Bonny Fleming, Donald Kahn, Peter Olver, and Harry Singh.

School of Mathematics

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