A f t e r m a t h

Message from the Chair
by Graeme Milton

I hope everyone had an enjoyable summer, and for those of you who are new here, welcome to the department. With the flood in LCB and additional budget cuts it was certainly an eventful start to my chairmanship. We were fortunate that insurance on the new building covered the costs of the damage and allowed work to proceed without being held up by legal disputes. To all of you affected in LCB, I am grateful for your patience: mid-October is the target date to have everything up and running in the new building, and we will then once again have the full use of a truly magnificent building. Many people are to be thanked for the ways they helped out during this crisis, especially Nelson Beebe, Vic Gabrenas, and Peter Alfeld.

We have an excellent and active department and one that is continuing to improve. We have the potential to become one of the best mathematics departments in the country and I'd like to see that happen. Part of this is perception: due to our relative isolation we do not always get the recognition we deserve. I'd like to see our department website reflect our strengths better. I'd also like to see a greater sense of community within the department, particularly across different fields of interest.

With Jim Carlson having done such a great job of being chairman for seven years it makes it hard to follow in his footsteps. But I'm glad that the department is healthy and thriving. With VIGRE and its many programs in full swing, and now with the IGERT program in Cross-Disciplinary Research Training in Mathematical Biology being recently awarded we are off to a great start.

Problem Solving Contest National Winner!

Wei-Shou Hsu, the reader for our local Undergraduate Problem Solving Contest, and recent Math Department graduate, won the national Problem Solving Competition held in Burlington, VT on August 3. He won a TI-92 calculator and was presented with a trophy. Brian Knaeble, our local winner, also participated. Both Brian and Wei-Shou particpated in MathFest as well as the Problem Solving Competition, and have submitted articles on their experiences:

MathFest Report
by Wei-Shou Hsu

One of the best things about being part of MathFest was the opportunity to speak with mathematicians with various backgrounds from all over North America. For example, during the opening banquet I was able to talk to many people who had recently received their Ph.D. degree and from these conversations I got an insightful view on the researches done in differenct areas of mathematics.

In addition, the program was packed with lectures on many different topics. A lot of the talks were geared towards teachers who would like to learn alternative approaches to their classes, but there were still many intended for general audiences that were interesting and thought-provoking. Some of the lectures were on advanced topics that were hard for me to follow, but more than anything they have really motivated me to explore deeper into mathematics. There were also student paper sessions during which undergraduate students presented the results of their research. I went to a few of them to get an idea on how other students do presentations.

The last day of MathFest was when the final of the problem solving contest took place. The contest was not quite what I had expected because the types of problems were really similar to those

given on a regular school exam. It was nonetheless an interesting experience for me, and I would like to thank Angie for giving me the opportunity to participate in the competition and also Professor Rossi and Professor Hartenstine for all the guidance and help they have given me throughout the year.

MathFest Report
by Brian Knaeble
Hillbilly Willy rides his six foot unicycle of doom, bands play in the alleyways, and hippies crowd mainstreet. This is Burlington, Vermont, home of Ben and Jerry's Ice Cream, Phish, and the 2002 summer MathFest program.

I had the privilege to attend along with recent U of U graduate Wei-Shou Hsu and Professor David Hartenstine. We all arrived separately but linked up the night of the opening banquet. The speaker was Joseph E. Gallian and the topic was, "Who is the greatest hitter in baseball history?" On the surface a simple question, but Gallian showed it to be anything but. After weighing tons of factors Ted Williams and Babe Ruth were crowned co-champions.

Over the next few days I found myself popping in and out of lectures and learning a great deal about how the math community functions as a whole. There were talks for general audiences such as the "Hedrick Lecture Series on Graphs, Eigenvalues, and Geometric Representation," as well as talks for teachers such as, "Fun and Games for Teaching Statistics."

There were even Student Workshops. The one I attended was "Topics in Graph Theory" and I found myself surprisingly well prepared. Bharat "the square root man" Ramakrishna (U of U undergraduate) had given me many graph theory problems over the course of my sophomore year under the guise of "Nodal Insanity." It goes to show the far reaching benefits of a U of U education.

In addition to what I expected there were talks that some might label a bit odd, such as "r dr r, Math Content from the Simpson's" and "Kevin Bacon and Graph Theory." The latter being a discussion about the Six Degrees of Kevin Bacon game which connects movie stars to each other in six steps or less. New terms such as KB# and Hollywood Centrality were coined. Turns out Kevin Bacon is not the most connected member in the history of Hollywood, in fact, he's not even in the top 1000.

The final day brought about the Undergraduate Problem Solving Competition. The rules were simple, first person to answer 7 questions correctly, in order, wins. And just like that Wei-Shou Hsu wins it. It wasn't even close. So congratulations to Wei-Shou on his excellent performance and wonderful representation of the University of Utah.

LCB/Math Center Disaster
by Peter Alfeld
On Saturday, July 13, at 8:02 a.m., the power failed in LCB. We do have a power outage in our buildings about once or twice a year. They usually last for an hour or so and have only negligible consequences. This particular power failure, however, was only the first indicator of a major disaster that is even now affecting our operation.

During the construction of the Math Center, many months earlier, somebody, for reasons that are still mysterious, had cut two bolts that were compressing the main water pipe supplying LCB and the Math Center. Over the course of several months the pipe slowly worked loose. Eventually, several hours before the power outage, the water pushed the pipe upwards and dislocated pipes and equipment attached to it. Then water started pouring underneath the utility room that is located below the level of the Math Center. It pushed upwards the concrete floor of that room and dislocated the equipment installed on it. Then some 60,000 gallons of water burst into the room and submerged it to a depth of about five feet. The water mixed with the hydraulic fluid of the elevator propulsion system and ruined all the electric equipment that it came in contact with. It buried the main air conditioning unit, the elevator motor and controls, power distribution panels, pumps, and phone and computer connections. By the time the damage was discovered, and the flow of water stopped, on Saturday morn-

water damage line

The water level in the mechanical room that serves LCB and the Math Center reached approximately five feet!

ing, LCB and the Math center were without power, air conditioning, air circulation, heating, phones, and computer connections. On the positive side, the UPS ("uninterruptible power supply") device in our machine room kept the computers going long enough for Nelson Beebe to shut them down orderly so that no data was lost.

Recovery has been proceeding since the disaster. Power to the lights in LCB and the Math Center was restored within a few hours. Phones came back on line within a few days. The most pressing immediate concerns were our computer services. They finally came back on line about a week after the disaster when temporary main power was restored to the two affected buildings. Effectively LCB and the Math Center were hooked up by an industrial strength extension cord to the transformer that used to supply Buildings 122 and 129. As you read this you can see that hookup snaking across the plaza.

There is still no air conditioning or heating in the two buildings. Some rudimentary air circulation is provided by drawing air from JWB through the Math Center and the attic of LCB to the outside, supported by personal fans located throughout the building that stir up the air. The tutoring center and computer labs are a little stuffy but open and used heavily. We are even holding classes in LCB. The skylights of the Math Center are covered to reduce the amount of sunlight, and hence heat, entering the building.

Of course, this disaster has been disruptive and a major nuisance. However, it has been gratifying to see how everybody involved (the people directly affected in our department, University Facilities and Planning, University Space Management, Gramoll Construction, Argonaut Insurance company, and the State of Utah) has been working together smoothly and closely to recover as quickly and effectively as possible. There has been no finger pointing or bickering over who should pay. The manner in which power was provided to the buildings within a week of the disaster was unorthodox, creative, unbureaucratic, and actually quite quick. The prolonged lack of computing facilities affected directly and significantly many hundreds of people. It was the greatest disruption of computer services in our department since we purchased our first slide rule!

The total price of the disaster will be approximately $450,000. Essentially the entire sum is covered by insurance under the State's OCIP program. We currently anticipate that everything will be back in working order by October 11. The elevator should be back in service any day now. Air conditioning won't come back before the end of the cooling season, but hopefully heating will be back before the beginning of the heating season.

We do appreciate your patience and good humor throughout this lengthy affair.

Summer Report

The Math Department does not slow down over the summer! The following are reports on some of this summer's activities:

Research Experiences for Undergraduates
Davar Khoshnevisan conducted an REU on Random Walks and Simulation July 3 through August 16, with VIGRE graduate students Sarah Geneser, Lars Louder and Robert Thorn assisting, and a guest lecture by Nelson Beebe on Random Number Generation and Network Security. Seven undergraduate students participated: Micah Allred (BYU), Rex Butler, Song Du, Amanda Ellis, Ron McKay, John Schweitzer (Hillsdale College, MI), and Matthew Taylor.

Several students also participated in individual REUs this summer: Amy Heaton, Ali Jabini, Ben Murphy, and Troy Finlayson worked under the direction of Ken Golden, Jenny Jacobs worked under the direction of Andrejs Treibergs, David Ayala worked under Nick Korevaar, and Michael Woodbury worked with Aaron Fogelson.

Participants and graduate assistants in the Random Walks and Simulation REU.

Minicourse: Complex Hyperbolic Geometry by Domingo Toledo

A minicourse on complex hyperbolic geometry was held May 13-24 as part of the VIGRE program. The course was organized by Jim Carlson and Domingo Toledo, with the help of Martin Deraux and Javier Fernandez. The program featured two outside speakers, Richard Schwartz of the University of Maryland and Elisha Falbel of the University of Paris VI. The participants included a lively group of 13 graduate students from various universities in the US (Chicago, Harvard, Houston,Illinois at Chicago, Maryland, MIT, Notre Dame, Stony Brook).

During the first week Carlson, Deraux and Toledo lectured on basic complex hyperbolic geometry, with problem sessions conducted by Deraux and Fernandez. During the second week Richard Schwartz gave eight lectures on his work on discrete groups acting on the complex hyperbolic plane. Falbel gave two lectures on his work with Parker on related group actions. The afternoons were devoted to computer experimentation, with demonstrations given in our new computer teaching lab. Richard Schwartz demonstrated his software for visualizing group actions on the complex hyperbolic plane and explained how the computer can be used to actually prove results. The quality of the lectures was superb, and the students were actively involved in the lectures and experimentation. There was also plenty of time for informal discussion, and a number of social activities were organized to bring the participants together. A group of eight outside participants also went on a weekend trip to Southern Utah.

Minicourse: Variational Methods and Nonlinear PDE, by Klaus Schmitt

With the financial support by the Department's VIGRE grant, a mini-course on Variational Methods and Nonlinear PDE took place in the period May 28 - June 7, 2002. The course was organized by David Hartenstine (VIGRE Assistant Professor), Matthew Rudd (VIGRE Graduate Fellow), and Klaus Schmitt (a PI of the VIGRE grant). Professor Jean Mawhin of Universite Catholique de Louvain (Belgium), a world renowned expert on the subject and known as an excellent lecturer, was invited as the principal lecturer. Other lectures were given by Utah colleagues Nick Korevaar, Jesse Ratzkin, Nat Smale, Andrejs Treibergs, and the organizers, and Jon Jacobsen (Penn State) and Vy Le (Missouri). Six graduate students from Duke,

Irvine, Penn State, Nebraska and Wisconsin were chosen to receive financial support from the grant to attend the course. Besides the lectures, discussion sessions for all lectures were organized by the student participants and four working groups worked on projects whose findings were discussed during the second week of the course. The lectures and some pictures of the course and associated social activities are available on the web:

http://www.math.utah.edu/~rudd/minicourse/lectures.html
http://www.math.utah.edu/vigre/minicourses/variationalpde/photos.html

Two further mini-courses on different subjects are being planned for 2003.

Minicourse participants go for a hike in the Wasatch Mountains.

Summer Program for High School Students

The Summer Mathematics Program for High School Students, largely funded by the VIGRE grant, is a three week enrichment program directed by Jim Carlson that exposes high school students to new mathematical ideas and challenging problems that engage their enthusiasm and develop their talent. It also gives the students an idea of the broad range of mathematical thought, its innate beauty, and its powerful role in science and technology.

This year, twenty high school students participated in the program, held June 10 - 27, 2002. Students attended lectures on Number Theory in the morning (given by Jim Carlson with Eric Cook as principal assistant), and workshops in the afternoon. The afternoon workshops of the first week, conducted by Jennifer Taback and Thom Pietraho, focused on Knot Theory, the second week's workshops, conducted by Bobby Hanson, focused on Combinatorics and Discrete Probability, while the workshops for the final week, conducted by Bob Guy, focused on Discrete Dynamical Systems.

ETOPIM Conference
by Ken Golden

During the week of July 15 - 19, 2002, the University of Utah hosted the Sixth International Conference on the Electrical Transport and Optical Properties of Inhomogeneous Media (ETOPIM 6) at Snowbird. The year 2002 marked the 25th anniversary of this unique conference series. Previous meetings were held in Columbus, Ohio (1977), Paris (1987), Guanajuato, Mexico (1993), St. Petersburg -- Moscow (1996), and Hong Kong (1999). The unusually diverse set of topics included photonic crystals and band gap structures, biocomposites such as heart tissue and smart slime molds, geophysical composites such as sea ice, rocks, and other porous media, conducting polymers, composites with negative index of refraction (so-called left-handed materials), nanocomposites, semiconductors, numerical methods, and inverse problems in medicine and geology. There were also a number of minisymposia on special topics organized by participants from outside Utah. The meeting was very successful, with about 150 participants representing over 20 countries, and was opened by President Machen. There were also a large number of students, both graduate and undergraduate, from the University of Utah participating in the meeting. The local organizing committee from the University of Utah consisted of Steve Blair (Electrical and Computer Engineering), Andrej Cherkaev, Elena Cherkaev, David Dobson, Ken Golden (Co-Chair), Chris Johnson (School of Computing), Jim Keener, Graeme Milton (Chair), and Valy Vardeny (Physics). The conference coordinator was Eleen Collins. Financial support for the conference was provided by the National Science Foundation, the Army Research Office, the College of Science, the Office of the Vice President, the Departments of Mathematics and Physics, Schlumberger-Doll Research Co., and Friends of the Mathematics Department (organized by J. Patton and D. Ballard).

Colloquia Times

Department: Thursdays 4:15, JWB 335

Graduate: Tuesdays 4:30, JWB 335

Undergrad: Tuesdays 12:55, AEB 350

IGERT Grant
by Jim Keener

The twenty first century is predicted by many to be the "Century of Biology." Indeed with many new discoveries in genetics and biochemistry, and with the recent mapping of the human genome, complex biological systems have become the focus of many investigations. It is clear that there is a great need for mathematicians to enter this investigation, and to bring their tools to bear on these enormously challenging problems.

The University of Utah is an ideal place for students to be trained to enter this brave new world. Mathematical Biology at the University of Utah is internationally renowned for the quality of its research, its faculty, and its training of graduate students. With the announcement of a new IGERT program, the NSF has enabled the Mathematics Department to take the next step toward training a new generation of Mathematical Biologists.

IGERT is the acronym for Integrative Graduate Education and Research Training, and this new program is entitled Cross-Disciplinary Research Training in Mathematical Biology. The goal of this new program is to give students a solid training in mathematics and expertise in an area of modern biological research. Students will participate in a variety of educational and research activities to accomplish this. In their first year of graduate work, they will take mathematics and biology coursework and participate in an introductory journal club as well as several biology/life science seminars. During their first summer they will do a laboratory rotation, which means working in a laboratory somewhere on campus, doing fieldwork, or an internship in a biotech/pharmaceutical company. Their second and third years of study will also involve a mix of coursework, journal clubs and group/lab meetings, and research working with a life science mentor as well as a Mathematics mentor. Life science mentors will come from many departments including Biology, Bioengineering, Biochemistry, Human Genetics, Internal Medicine, Medicinal Chemistry, Neurology, Opthalmology, Pathology, and Physiology. Students will work broadly in one of four areas of Mathematical Biology: Biofluids, Ecology and Evolutionary biology, Neuroscience, and Physiology.

Although the program of study and research will be interdisciplinary, it will be administered within the Mathematics Department. This means that students in the program will be Mathematics graduate students studying toward a Ph.D. in Mathematics. Over the course of the five year grant, IGERT funds will allow admission of about six new graduate students per year.

Jim Keener is the Principal Investigator for this grant and shares administrative duties with the co-Principal Investigators Fred Adler, Paul Bressloff, Aaron Fogelson and John Sperry (Biology).

Welcome
We are welcoming many new people to our department this year:

Faculty
David C. Dobson (Professor) joins the department from Texas A&M University. He received his Ph.D. in 1990 from Rice University.

Christopher D. Hacon (Assistant Professor) received his Ph.D. from UCLA in 1998, and is coming to us from the University of California - Riverside. We are glad to have him back!

Instructors
Evan Haskell (Scott Assistant Professor) received his Ph.D. from the Courant Institute of Mathematical Sciences, New York University in 2000. His interests lie in Math Biology.
David Levin (Wylie Assistant Professor) received his Ph.D. from the University of California, Berkeley in 1999. His interests are in Probability and Statistics.

Nancy Sundell (Scott Assistant Professor) received her Ph.D. in 2002 from Cornell University. Her focus is in Theoretical Ecology.

Visitors
Vladimir Vindogradov received his Ph.D. in 2002 from Tel Aviv University. He will be working with Graeme Milton and Andrej Cherkaev.

Graduate Students
Our new graduate students are Nathan Albin, Maria Bell, Erin Chamberlain, Edgar Diaz, Adam Keenan, William Koppelman, Aaron McDonald, William Nesse, Emily Putnam, Ian Renner, Christopher Robinson, Mindy Scott, Joshua Thompson, John Zobitz, Jason Christofferson, Matthew Dalton, Wendy Langeberg, Angie Marchant, Nao Mimoto, Steffanie Moore, David Novum, Junghoon Oh, and Greg Stoddard.

Staff
Catherine Giesbrecht is the Administrator of the IAS/Park City Mathematics Institute (PCMI).

Upcoming Events
Wednesdays: GRE Prep Seminar, JWB 308, 2:00 - 3:00

Sept. 18: University of Utah Math Circle begins, 4:00 - 6:00 p.m.

Oct 3-4: Fall Break, no classes

Oct. 8: Science and Engineering Career Fair, Union Ballroom