Fall 2005

EMISSARY

Mathematical Sciences Research Institute

www.msri.org

Notes from the Director

David Eisenbud

Puisque tout passe. . .

Chantons ce qui nous quitte
avec amour et art;
soyons plus vite
que le rapide départ.

— from *Recueil: Verger*, by Rainer Maria Rilke

Succession and Search

I've just made a difficult choice: when my second five-year term as Director ends in July 2007, I will step down and take up my post as professor at Berkeley full time.

My years at MSRI have been immensely exciting and rewarding. The job is incredibly varied, the staff excellent, the community highly supportive. The Institute is prospering, and there are many new opportunities for action. Having done this job since 1997, I feel I see possibilities I would not have understood when I began. I cannot imagine a mathematical-administrative job more exciting than this one. I feel particularly blessed to have succeeded Chern, Kaplansky and Thurston in the work of building MSRI for the mathematical community.

My time as director will have been one of my life's peaks — perhaps the highest. On the other hand, I'm beginning to envy the mathematicians who pass through the Institute for the freedom and time to think that is common in the academic profession. I find that I relish the periods I spend working on mathematical problems, and that they come too seldom. I long for more, and for time to mentor and teach. I'll turn sixty in 2007. I don't (anymore) think sixty is old. . . but the finiteness of life is all too clear. Sixty seems a better age to get back into the full activity of being a professor than sixty-five.

It's not too soon to begin a search for my successor. By the time you read this, the Board of Trustees will have established a search committee, and there will be an ad and a job description available from MSRI's home page. If you know of any great candidates, please let me or the committee know!

For my part, I will stay close to the Institute. I look forward to helping the new Director in any way I can.

Sheila Newbery

David Eisenbud leads a tour of the construction site. See page 4

Programs

Each fall brings new variety to MSRI. This semester both programs are on core subjects in the theory of partial differential equations: Nonlinear Elliptic Equations and Nonlinear Dispersive Equations. Estimates abound! As an algebraist, I'm relatively an outsider to this material; but it brought back happy memories of courses I took from Zygmund and Calderón at Chicago long ago (also of the parody "Zygman and Calderobin versus the Elliptic Operator," which we grad students had the gall to put on as a beer party skit. . .)

Bart's friends

MSRI has hosted some foremost modern English playwrights for discussions of the science present in their plays. This time we had something different: the Simpsons. Some of the writers have advanced mathematics degrees, and there are plenty of embedded math jokes (for an example, see the spread on page 8). Sarah Greenwald is an insider in this circle, runs a website (http://www.mathsci.appstate.edu/ sjg/simpsonsmath/) and interviewed some of the Simpsons and Futurama writers in an MSRI program on October 16.

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Notes from the Director

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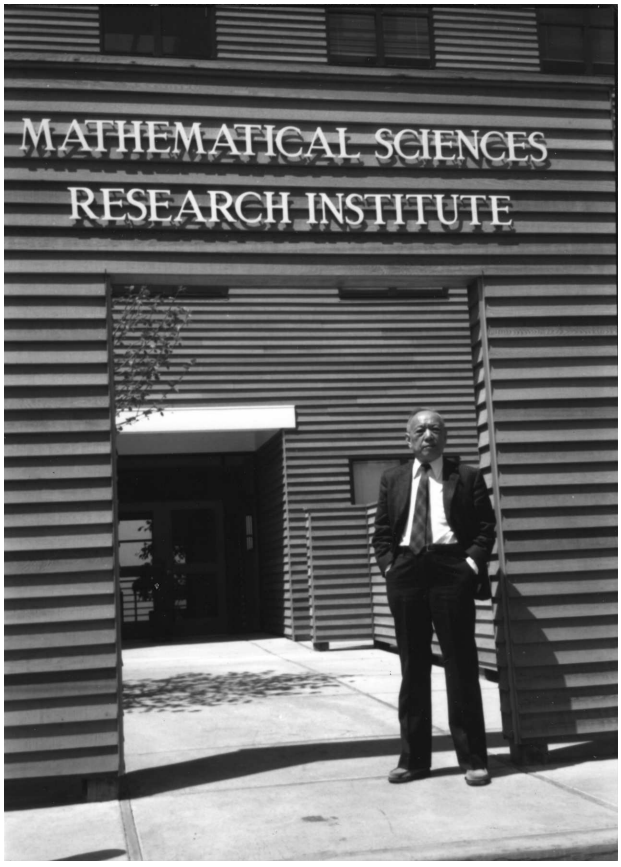
Building

A major preoccupation for me and others on the MSRI staff is bringing the building project to completion. What color will the carpet be? How high are the backs of the new chairs in that unusual (and gorgeous) Simons Auditorium? How far up does the wood paneling go in the Austine McDonnell Hearst Library? What audio-visual equipment is scheduled for the Baker Board and Seminar Room? What shade is the outside of the new part of the building going to be painted? Where is the spigot for watering plants on the Strauch Auditorium Outlook? Is the new counter for serving tea going to be made of granite or plastic? What color is the granite of the donor wall in the Berlekamp Garden? These are just a few of the questions we wrestle with. Soon, soon it'll be done: we expect to open the new programs there in January 2006. I believe the new shape of the Institute will make it a great home for research and researchers. We can't wait!

Chern in Person

If you had come to the (then) new MSRI building in 1985, you might well have been greeted by Chern himself, standing cheerfully by the front door with his hands in his pockets. Sadly, it's too late to meet Chern himself, but thanks to Jim Simons' interest, the famed Brooklyn sculptor Neal Estern is working on a full bronze sculpture to stand next to MSRI's new front door, in much the same pose as in this historic photograph:



Estern is perhaps best known for his contribution to the Franklin Delano Roosevelt Memorial in Washington, DC. He also sculpted the carved limestone figure of Eleanor Roosevelt at the National Cathedral, the standing bronze of Fiorello LaGuardia for Greenwich Village in New York, and the bust of JFK for the Kennedy Memorial in Brooklyn.

The statue of Chern won't be ready for the building opening — the $250,000 commission is expected to take about two years to complete — but when it is installed, I hope it will give visitors some sense of the immense contribution Chern made to the Institute in that fertile partnership with Isadore Singer and Calvin Moore.

Hugo and His Successors

The search for a new director is supposed to happen once every five or ten years; but MSRI changes Deputy Directors roughly every second year, since it is generally hard for a senior academic to get leave for longer than that.

As many of you remember, Hugo Rossi joined me at MSRI as Deputy Director when I first came to the Institute. He worked with me for two years then, and returned to the position in 2003. Of course he'd already been part of MSRI for a long time: he was on the Board from the beginning, and was its Chair from 1985 to 1989. The community owes him a great deal of thanks for all he's done.

Hugo has announced that he wants to retire again from the position in a year or two. We've shared in all of MSRI's activities, and I'll miss him sorely. We're now advertising for a new deputy director — in fact, we might hire two. The combined jobs of director and deputy director have expanded a lot as the institute has expanded its mission, and the Trustees have suggested that we expand the directorate so that we can make full use of MSRI's possibilities.

Perhaps because the potential of MSRI is so great, the institute has attracted very strong deputies over the years — Cal Moore, Rob Kirby, Robert Osserman, Emery Thomas, Lenore Blum, Tsit-Yuen Lam, Carol Wood, Joe Buhler, Michael Singer, Robert Megginson, in addition to Hugo, make quite an honor roll! I'm optimistic that we can continue to find such imaginative leaders and strong administrators in the future. If you are interested in the position, please let me or Hugo know. A copy of the advertisement is at http:/www.msri.org/about/jobs/deputydirector.

Associate Director

In the meantime, we've made a temporary hire: Gadiel Seroussi, known for his work on information theory and as the leader of the the information theory group at Hewlett-Packard Laboratories, is joining us for a year as Associate Director on October 15. He will work with Hugo and me on all of MSRI's activities, and his background will allow him to play a special role in our Corporate Affiliates program. Energetic and cheerful, Gadiel is a native of Uruguay, and keeps his contacts there. I'm looking forward to working with him.

Puzzles Column

Elwyn Berlekamp and Joe P. Buhler

1. Say that an ordered sequence $a_1 \le a_2 \le \cdots \le a_n$ of real numbers has a *perfect median* if there is a term such that the sum of the terms preceding it is equal to the sum of the terms following it. For instance, 6 is a perfect median of the sequence 1, 2, 3, 4, 5, 6, 7, 8. For which n does the counting sequence 1, 2, ..., n have a perfect median?

Comment: This problem is due to David Gale.

2. A group of n people meet, and agree to play as a team in a game whose rules are explained to them. They are then allowed to discuss strategy.

After the strategy session, an adversary places red or blue hats on everyone's head; from this point on, *no* communication is allowed between the players. Each person can see the color of all hats but their own. After exactly one minute, the players simultaneously predict their hat color by sending email saying either "my hat is red" or "my hat is blue." The team wins (say, one million dollars from the adversary) if the n emailed statements are either *all* true or *all* false.

Devise a strategy that *guarantees* that the team wins, no matter how the adversary chooses to place the hats.

3. In the same circumstances as the previous question, what strategy can the team follow so as to maximize the number of correct answers made? The hats-placing adversary is allowed to know the strategy, so you want to find the strategy with best possible worst case.

Comments: Hats problems seem to be an amazingly inexhaustible genre; the two problems above can also be posed with infinitely many players, and these will be discussed on our problem web-site in due course.

4. As all but the most culturally oblivious of you will know, a Sudoku puzzle is a 9-by-9 grid, with some squares containing digits. The goal is to completely fill in the grid, using digits 1 to 9, in such a way that each row, column, and segmented 3-by-3 subgrid has each digit exactly once. Thus a completed Sudoku grid is a Latin square subject to further constraints on the 3-by-3 subgrids. The initial partially filled grid is assumed to have a unique completion.

The diagram on the right does not qualify as a Sudoku puzzle, since it has many completions. However, the values of two of the nine central grid squares are uniquely determined by the initial data. Which squares are they, and what are their uniquely determined values?

5. Consider a junior version of Sudoku: a 4-by-4 grid is solved by filling each square with a digit between 1 and 4 in such a way that each row, each column, and the 2-by-2 NE, SE, SW, and NW quadrants contain each digit.

(a) How many completed junior-Sudoku grids are there?

(b) What is the least possible number of initially filled-in squares in a junior-Sudoku problem? (Naturally, the completion must be unique.)

6. Prove that there exist noncongruent triangles with the same area and perimeter. Exhibit an example with integral side lengths. Exhibit an example with integral side lengths and integral area. Exhibit a pair of nonisosceles triangles with these properties.

Comment: This problem is discussed in the third edition of Richard Guy's *Unsolved Problems in Number Theory* (p. 295). It came to our attention from discussions between Andrew Mayer and people interested in high school math pedagogy; we thank Andrew for the problem, and Noam Elkies for interesting remarks and the reference above.

	7		6					
				1		9		
			5					
6		4				2	9	8
	8						4	
			9		6			
	3		2		5			

Ceci n'est pas un sudoku.

New Building Nears Completion

David Eisenbud

MSRI's Human Resources Committee tours the building site: Javier Rojo, Janis Oldham, Hugo Rossi, Ricardo Cortez, Cora Sadosky, Bob Megginson, Nate Dean (chair).

David Eisenbud

Sheila Newbery

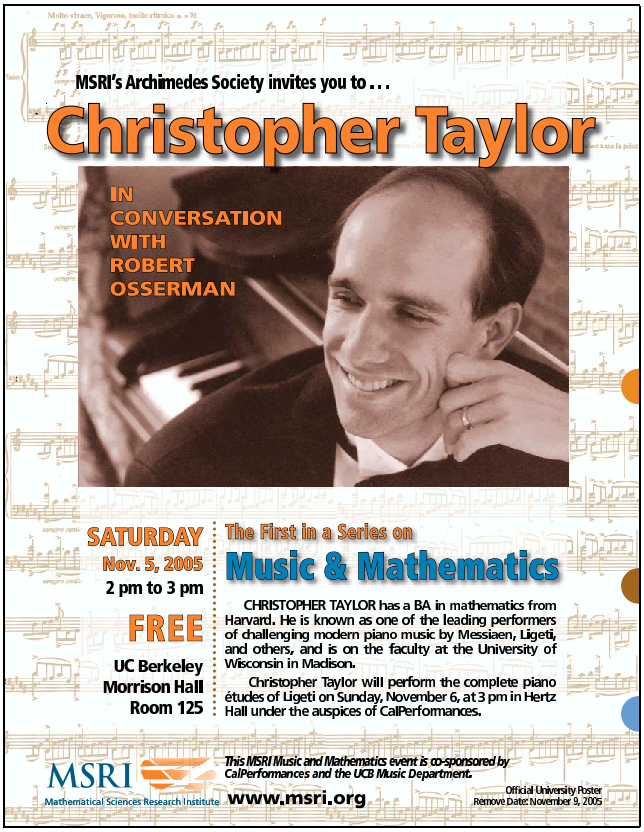
Left: The eastern wall of the new Simons Auditorium faces the wooded hills. Right: Our new Associate Director, Gadiel Seroussi (looking up) discusses the finer points of the construction with Elwyn Berlekamp, longtime MSRI friend and benefactor and former chair of the Board of Trustees.

David Eisenbud

Inside the new Simons Auditorium

Music and Mathematics

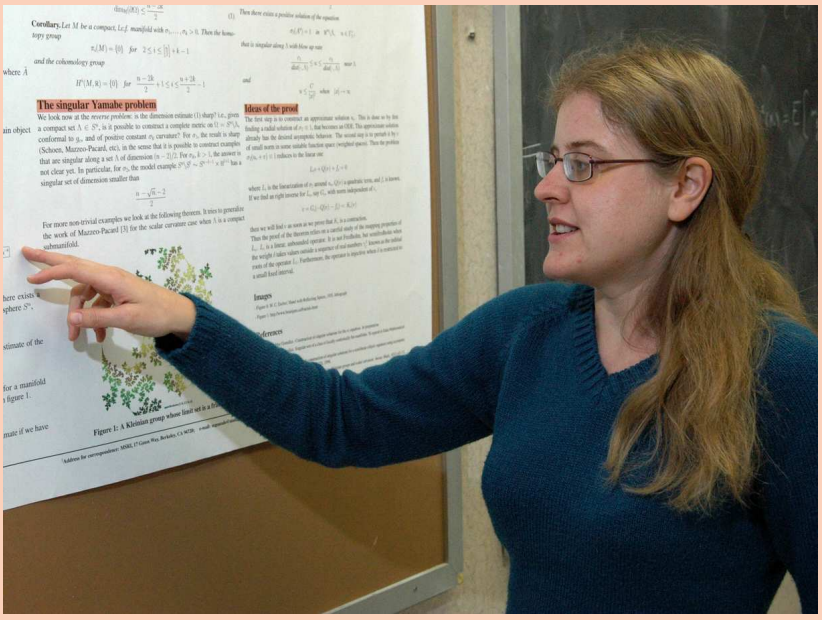
A new series of outreach events was launched on November 5 with a combined talk and performance by Christopher Taylor, in conversation with Special Projects Director Bob Osserman. The event was very well-attended, and more are being planned. Here is the poster that was distributed throughout the Bay Area:



MSRI's First Poster Session

Adopting a good idea from the Institute for Mathematics and its Applications in Minneapolis, MN, our Institute has begun adding poster sessions to some of its workshops and inviting the MSRI postdocs to showcase their work in this additional way. A big new printer, capable of printing color images over 1 meter (42 inches) wide, adds to the fun and luster of the events.

Here Maria del Mar González, a postdoc in the fall 2005 program on Nonlinear Elliptic Equations and its Applications, explains her work on fully nonlinear differential equations and its relation to Kleinian groups.



David Eisenbud

Nonlinear Partial Differential Equations in Conformal Geometry

Paul Yang, Princeton University

In the Fall of 2005 there were two MSRI programs in Nonlinear Partial Differential Equations, one of which focused on Elliptic PDEs. A central component of that program is the area of nonlinear PDEs in Conformal geometry, that branch of Riemannian geometry concerned with spaces in which there is a well defined measurement of angles between two tangent vectors. We say that two Riemannian metrics g and g' are conformally equivalent if they are pointwise proportional: $g' = \rho g$. A major goal of the PDE method is to find geometric objects that do not change under conformal equivalence, called the invariants of conformal metrics, and to develop the analysis of these invariants.

The systematic study of local conformal invariants goes back to work of Élie Cartan and Tracy Thomas, and in more recent years to work of C. Fefferman and R. Graham. The ambient metric construction of Fefferman and Graham is elegant: the space is enlarged by two extra dimensions, one representing the length scaling and the other determining a Ricci flat condition leading to a nonlinear partial differential equation. The local Riemannian invariants of the ambient metric space are then the candidates of the local conformal invariants of the original space. The ambient metric construction is closely related to the AdS/CFT correspondence, a concept studied extensively by physicists expressing an equivalence between a string theory or supergravity defined on some sort of Anti de Sitter space and a conformal field theory defined on its boundary. The philosophy of the ambient metric construction is that the conformal geometry of the original space is equivalent to the Riemannian geometry of the ambient space. Recent work by R. Graham (Seattle) and K. Hirachi (Tokyo) completes the program to find all local conformal invariants by the ambient metric construction. The ambient space construction has also provided insights, such as that in the work of Graham and Zworski, relating the scattering theory of asymptotically hyperbolic manifolds to the conformal geometry of the boundary at infinity.

Among the conformal invariants found are a family of conformally covariant linear differential operators, the simplest of which is the well-known conformal Laplacian L. The conformal Laplacian is useful in relating the scalar curvatures of two conformally equivalent metrics involving the second derivatives of the scaling factor ρ. This gives rise to the famous Yamabe problem: to solve for the scaling factor ρ so that the new metric has constant scalar curvature. The successful solution of this problem is the result of the combined effort of H. Yamabe, N. Trudinger, T. Aubin and R. Schoen. The analysis of this equation is interesting for several reasons. The principal one is the lack of compactness of the solution space in this equation, and the challenge is to show that the lack of compactness only occurs in the case of the round sphere. The positive mass theorem of Schoen–Yau and Witten has provided this important characterization of the sphere. Since then there has been an enormous amount of work devoted to understanding the analysis and geometry of this equation. Powerful analytic tools like the moving plane method, the Pohozaev identities and evolution flow were adapted by many people to analyze this equation.

These techniques also were used to study a family of more complicated equations in which the second derivatives enter in a nonlinear way. These are called fully nonlinear equations. This set of equations gives strong control of the local geometry of the space in question. Many people are contributing to the development of these equations. Hardly a week goes by this fall without someone posting an article resolving some aspect of these equations. For instance, in the case of locally conformally flat spaces (spaces which are locally just rescaling of Euclidean space), some of these equations are relatively well understood. It is possible to apply these methods to classify a number of conformal structures, principally in the locally conformally flat case and some special conformal structures in dimension four.

These techniques originated from the study of convex geometry, and were also recently developed to study a class of problems associated with the mass transport problem of Monge, another important component of the Nonlinear Elliptic PDE program. People in the conformal geometry group were surprised to see that exactly the same equations were being studied in mass transport as explained by Robert McCann in ongoing conversations. Motivated by Perelman's work, Alice Chang, Matt Gursky and the author introduced a family of conformally covariant operators associated to a conformal metric and a measure. As smooth measures are closely tracked by diffeomorphisms, these invariants thus reflect the action of the diffeomorphism group. It is natural to expect that ideas and techniques from the study of mass transport may be useful in development of these equations.

VMath Special Productions: Gröbner Bases with Bernd Sturmfels

In addition to recording the lectures at workshops, MSRI undertakes some special productions, usually with higher production values, for wider audiences. The first series of these productions to have begun is *New Horizons in Undergraduate Mathematics*. These videos will showcase great lecturers speaking on topics from current research that are important, accessible and ready to enter the undergraduate curriculum.

The first production in the New Horizons series is a pair of lectures on Gröbner Bases, by Bernd Sturmfels, of UC Berkeley. We anticipate future lectures on algebraic topology and its applications (Gunnar Carlsson, of Stanford) and Hyperbolic Geometry (Colin Adams, Williams). The New Horizons Series has been started through a generous grant from William Randolph Hearst III.

News from the K-12 Education Front

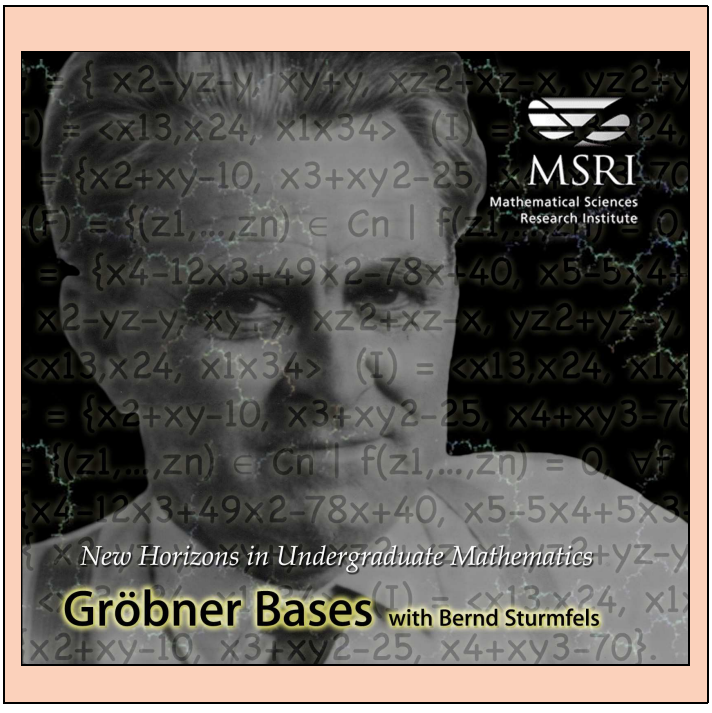
New Math Circles Started

Zvezdelina Stankova was a postdoc at MSRI in 1997 (she's now tenured at Mills College, nearby). Her own involvement with mathematics started with the Math Circle and Olympiad program in Bulgaria, and she told us we were missing out on a very good thing for getting kids involved. (Almost) no sooner said than done: She and Hugo Rossi, soon with Paul Zeitz's help, started the Bay Area Mathematical Olympiad and Math Circle, and these organizations have been going strong ever since. Supported by the Hilde Mosse foundation, they've turned out to be highly effective and motivational: just for example, the tiny Berkeley Math Circle fills a wildly disproportionate number of slots on the national math olympiad teams.

Because the Circles and Olympiads have proved so successful at making kids passionate about mathematics, they've become an important program for us. This year, with support from Moody's KMV and the Bechtel Foundation, we've been able to start a new circle, aimed at younger kids from the inner city and their teachers, headed by Paul Zeitz and Matthias Beck.

But this movement should be national! A few other communities already have math circles but not many — the Math Circle at Cambridge is a well-known example. We hope to do something about this. Last December, with help from Akamai and the NSF (EHR division), we held the first national conference for people interested in running such organizations, and we've just received grant money from the NSF to run a second, in 2006. We also have support from Akamai to make videos that show some different styles of Math Circle work to help interested people start Circles of their own.

Mark Saul, who has just stepped down from an NSF position, is going to work with us on this. We intend to devote part of the annual meeting of our Academic Sponsors (Friday, March 4, 2006) to Math Circles: how they work and what they do.



Newton Fellowships

MSRI Director David Eisenbud is serving as a board member on a novel program started by MSRI Trustee James H. Simons to boost the number of qualified high school math teachers.

The Newton Fellowship Program of Math for America (MfA) focuses on the shortage of adequately qualified mathematics teachers in our nation's public high schools. The Newton Fellowship Program trains mathematically-talented individuals to become high school math teachers and supports them in the early years of their careers. The program currently operates in New York City and is endorsed by the New York City Department of Education. MfA will appoint over 180 Newton Fellows in New York between 2004 and 2008. Math for America expects to expand the program to other cities in the future. The project is currently funded by Simons.

Newton Fellows are undergraduate math majors who receive a stipend of $90,000 over five years, obtain a full tuition scholarship to Master's level teacher preparation program, achieve a position as a high school math teacher. They obtain New York State Teaching Certification and earn a New York City teacher's salary in addition to the stipend from MfA. They develop classroom skills through MfA's mentoring, coaching, and support services, and build a life-long career through professional development activities and through becoming a part of a group of outstanding math teachers.

Simons, a mathematician (the Chern–Simons invariant is conamed after him), is president of Renaissance Technologies Corporation, an investment firm dedicated to the use of mathematical methods. Previously he was chairman of the Mathematics Department at the State University of New York at Stony Brook. Earlier in his career he was a cryptanalyst at the Institute of Defense Analyses in Princeton, and taught mathematics at the Massachusetts Institute of Technology and Harvard University.

Simons' commitment to solving the critical shortage of qualified math teachers is substantial. Math for America is his brainchild. As a mathematician and hedge fund operator, he has joined with other top mathematicians, financiers and educators, founding the organization in early 2004 with a mission to improve math education in our nation's public schools.

The Simpsons Rule!

Some images from the MSRI event on Sunday, October 16, 2005

Photos by Anne Brooks Pfister and David Eisenbud

Jeff Westbrook | Sarah Greenwald | Ken Keeler

Ken Keeler has a PhD in applied mathematics from Harvard University and worked at Bell Labs before switching careers to write for David Letterman. After moving to Hollywood he wrote for both *The Simpsons* and *Futurama* and has won Writer's Guild and Emmy Awards.

Jeff Westbrook has a PhD in computer science from Princeton University. He was an associate professor of computer science at Yale University and also worked at AT&T Bell Labs before writing for *Futurama*. He has been writing for *The Simpsons* since 2004.

Sarah J. Greenwald has a PhD in mathematics from the University of Pennsylvania. She is an associate professor at Appalachian State University and won the 2005 Alder Award for Distinguished Teaching from the Mathematical Association of America. Among other reasons why her teaching is distinguished is her use of popular culture in the classroom.

Her web site simpsonsmath.com, coauthored with Andrew Nestler of Santa Monica College, contains much more information about mathematics in *The Simpsons*. Check it out!

Connections Program for Women

Ruzena Bajcsy (middle ground, seated on chair) and some of her "students" at the MSRI Workshop Introduction to Image Analysis, the first workshop in the new Connections Program for Women in Mathematics.

Two short workshops were held in 2005 as a first step in providing women researchers in the area of the MSRI program an opportunity to meet together and establish bonds which will persist through the program. One was connected with the Image Analysis program and ran on January 21–22, and the other was an Introduction to Elliptic Partial Differential Equations, and ran on August 11–12.

Both were grounded in talks providing an overview of the field, while a central focus was on other formal and informal sessions providing opportunity for the development of interactions among the women mathematicians. The events were announced on the MSRI website, and all applicants were welcomed at the mathematical activities, which wound up being evenly balanced between the two genders, whereas in the typical mathematics workshops women are still in the minority.

The first workshop, organized by Ruzena Bajcsy, Jana Kosecka and Kathryn Leonard, was part of the parent program on Mathematical, Computational and Statistical Aspects of Image Analysis. The mathematical lectures concentrated on current approaches to image analysis, including harmonic analysis, statistical modeling, mathematical techniques of perceptual organization, and variational methods. The intent to bring together advanced graduate students, recent postdocs and established mathematicians to form a good working community was realized. The event was also meant as a lead-in to the Introductory Workshop of the parent program, which took place the following week (January 24–28).

The second Workshop for Women in Mathematics inaugurated the fall program on Nonlinear Elliptic Equations and Applications. Organized by Alice Chang of Princeton University and Craig Evans of UC Berkeley, the mathematical talks provided an intensive introductory minicourse on elliptic PDEs. Evans gave a series of lectures on the basic theory and estimates for linear and nonlinear elliptic equations, with applications to variational problems and to nonlinear systems. Chang lectured on applications of elliptic PDEs to conformal geometry and other geometric problems. This meeting, like the first, served to integrate graduate students, postdocs and more senior mathematicians providing background for the following week's Introductory Workshop in Nonlinear Elliptic Equations and their Applications.

Two such workshops are planned for 2006 as part of MSRI's initiative "Connections for Women":

- Computational Applications of Algebraic Topology, August 31, 2006 to September 01, 2006, organized by Susan Holmes
- Geometric analysis, Ricci flow, and porous medium equations, September 7–8, 2006, organized by Christine Guenther and Panagiota Daskalopoulos.

See http://www.msri.org/calendar/workshops for more details.

Forthcoming Workshops

Most of these workshops are offered under the auspices of one of the current programs (see Director's Notes starting on the front page). For more information about the programs and workshops, see www.msri.org/calendar.

January 9 to January 20, 2006: *Stringy Topology in Morelia*, organized by R. Cohen (Stanford), J. Morava (Johns Hopkins), A. Adem (UBC/UW–Madison), Y. Ruan (UW-Madison). Local Organizers: M. Aguilar (UNAM-Mexico City), D. Juan-Pineda (UNAM-Morelia), J. Seade (UNAM-Cuernavaca)

January 17 to January 21, 2006: *Introductory Workshop in Rational and Integral Points on Higher-Dimensional Varieties*, organized by Jean-Louis Colliot-Thélène, Roger Heath-Brown, János Kollár, Bjorn Poonen (chair), Alice Silverberg, Yuri Tschinkel

March 20 to March 24, 2006: *Generalized McKay correspondences and representation theory*, organized by Yongbin Ruan, H. Nakajima, G. Mason

March 27 to March 31, 2006: *Cohomological approaches to rational points*, organized by Fedor Bogomolov, Antoine Chambert-Loir, Jean-Louis Colliot-Thélène (chair), A. Johan de Jong, Raman Parimala

April 10 to April 12, 2006: *Mathematics of Relaying and Cooperation in Communication Networks*, organized by Michael Gastpar, Gerhard Kramer, J. Nicholas Laneman

May 03 to May 05,2006: *Mathematical Systems Biology of Cancer*, organized by Dick Karp, Bahram Parvin, Terry Speed, Paul Spellman, Carolyn Talcott, Wing Wong

May 13 to May 18, 2006 at the Banff International Research Station: *Analytic methods for diophantine equations*, organized by Michael Bennett, Chantal David, William Duke, Andrew Granville (co-chair), Yuri Tschinkel (co-chair). Jointly sponsored by MSRI and CRM.

May 18 to May 20 2006: *Women in Mathematics: the legacy of Ladyzhenskaya and Oleinik*, organized by Susan Friedlander, Barbara Keyfitz, Irene Gamba and Krystyna Kuperberg

May 22 to May 27, 2006: *New developments in the geometry and physics of Gromov-Witten theory*, organized by Mina Aganagic, A. Klemm (Wisconsin), Jun Li (Stanford), R. Pandharipande (Princeton), Yongbin Ruan (Wisconsin)

August 31 to September 1, 2006: *Connections for Women: Computational Applications of Algebraic Topology*, organized by Susan Holmes

September 05 to September 8, 2006: *Introductory Workshop on Computational Applications of Algebraic Topology*, organized by G. Carlsson, P. Diaconis, G. M. Ziegler

September 7 to September 8, 2006: *Connections for Women: Geometric analysis, Ricci flow, and porous medium equations*, organized by Christine Guenther and Panagiota Daskalopoulos

September 11 to September 15,2006: *Introductory Workshop on Geometric flows and function theory in real and complex geometry*, organized by Bennett Chow, Peter Li and Gang Tian

September 18 to September 22, 2006: *Workshop on Application of topology in science and engineering*, organized by G. Carlsson, P. Diaconis, and S. Holmes

October 02 to October 06, 2006: *Workshop on Topological methods in combinatorics, computational geometry, and the study of algorithms*, organized by G. Carlsson, P. Diaconis, R. Jardine, and G. M. Ziegler

October 23 to October 27, 2006: *Analytic and computational aspects of elliptic and parabolic equations*, organized by Panagiota Daskalopoulos, Peter Li and Lei Ni

January 11 to January 12, 2007: *Connections for Women: Dynamical Systems.*

January 15 to January 19, 2007: *Introductory workshop on Dynamical Systems with emphasis on extended systems*, organized by Chris Jones (chair), Edgar Knobloch (UC-Berkeley-Physics), Nancy Kopell (Boston U), Lai-Sang Young (Courant)

March 12 to March 16, 2007: *Geometric Evolution Equations*, organized by Bennett Chow, Richard Hamilton, Gerhard Huisken, Chuu-Lian Terng, and Gang Tian

March 19 to March 23, 2007: *Stochastic Dynamical Systems and Control*, organized by Jonathan Mattingly (Duke), Igor Mezic (UCSB-Chair), Andrew Stuart (Warwick)

Current and Recent Workshops

Most recent first. For information see www.msri.org/calendar.

December 05 to December 09, 2005: *Probability, Geometry and Integrable Systems*, organized by Bjorn Birnir, Darryl Holm, Charles Newman, Mark Pinsky, Kirill Vaninsky, Lai-Sang Young

November 28 to December 02, 2005: *Geometric and Analytical Aspects of Nonlinear Dispersive Equations*, organized by Nicolas Burq, Hans Lindblad, Igor Rodnianski, Christopher Sogge, Sijue Wu

November 18 to November 22, 2005 at the Banff International Research Station: *Flavors of Groups*, organized by Mladen Bestvina, Jeff Brock, Jon Carlson, Persi Diaconis, Hugo Rossi

November 14 to November 18, 2005: *Optimal Mass Transport and its Applications*, organized by L. Craig Evans (U.C. Berkeley), Wilfrid Gangbo (Georgia Tech), Cristian Gutierrez (Temple University)

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Linda Riewe, Library Assistant, 643-1716, *linda*
James T. Sotiros, Director of Development, 643-6056, *jsotiros*

Come to the Institutes' Open House at the January 2006 Joint Meetings in San Antonio, TX!

Thu, January 12, 2006
Marriott Riverwalk
5:30pm to 8:00pm
Alamo Ballroom D/E/F

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