



# Quaternion

Department of Mathematics Newsletter

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## CHAIRMAN'S COMMENTS

What types of training in mathematics are most appropriate to prepare students to work as mathematicians in non-academic settings? That is the question addressed in a recent issue of SIAM News (August 1993) by Dan Kalman, who is a mathematician who has worked in industry. His insights are worth sharing for students and teachers of mathematics alike.

Several requisites for a mathematician stand out. First, one must have the ability to work on projects with multidisciplinary teams consisting of other mathematicians, engineers, chemists, and so forth. Although some projects are individual efforts, that is the exception rather than the rule. Second, there must be an ability to do self-directed study in order to acquire the necessary background to work on a new application. Third, one must be able to communicate effectively in both verbal and

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## DEPARTMENT NEWS

**Dr. A.G. Kartsatos** was a member of the organizing committee of the International Conference on Functional Differential Equations in Guangzhou, China, which was organized by the Mathematics Institute of the Chinese Academy of Sciences and seven universities. He also gave one of the plenary talks with the title: "Compactness Methods in the Theory of Nonlinear Functional Evolutions."

Dr. Kartsatos has also been invited to give a one-hour lecture at the 5th International Colloquium on Differential Equations in Plovdiv, Bulgaria, August 18-23, 1994. The Colloquium is organized with several other institutions, including l' Association Suisse d' Informatique, the Canadian Mathematical Society, the London Mathematical Society, the University of Hamburg, and the University of Plovdiv. Tentative title of the talk: "Nonlinear Operator Equations

and Compact Evolution Operators in Banach Spaces."

**Dr. Y. You**, as a main speaker, gave two lectures in the Workshop on Qualitative Aspects and Applications of Nonlinear Evolution Equations held in Trieste, Italy, on May 3-14, 1993. His lectures were on "Semiflows and Global Attractors" and "Inertial Manifolds of Nonlinear Evolution Equations and Applications".

Dr. You was also invited and gave a talk on "Quasi-Riccati Equations and Nonlinear Synthesis of Optimal Control in Hilbert Spaces" at the Minisymposium on Control of PDEs and a talk on "Optimal Control of a Ginzburg-Landau Equation" at the Special Session of Control Systems Governed by PDEs in the AMS Meeting #886 held in College Station, Texas, on October 21-23, 1993.

Additionally, Dr. You has been invited by Professors E. Fabes and G.R. Sell to the University of Minnesota to serve as a Visiting

Associate Professor from  
January-June 1994.

**Dr. M. Parrott** gave an invited talk on "The Effects of Delays on Certain Reaction Diffusion Equations" at a Special Session on Reaction Diffusion Systems held at the AMS meeting in College Station, Texas, on October 22-23, 1993.

## STUDENT NEWS

Since the last issue, the following degrees have been awarded:

### *B.A. in Mathematics*

Larra L. Acevedo  
Erika Yvonne Blanken  
Werner H. Bloch  
Rebekah Bonebreak  
Sheila Karen Brown  
Susan René Chamlee  
Kathleen Claire Clark  
Cynthia Marie Conway, Magna  
Cum Laude  
Jeffrey Patrick Dutra  
George MacKendrick Gregory  
Melissa Dawn Hagan  
John Mansfield Hicks  
Robin L. Ingle  
Suzanne Marie Joseph, Summa  
Cum Laude  
William Berry Maloch  
Jamie Lee McGauhey, Cum Laude  
Timothy William Ryder  
Roger M. Schafer  
Jill Silver  
Robert William St.Clair  
Domenic L. Tollis  
Melissa April Wadsworth  
Eric Kennan Wing

### *B.A. in INS/Mathematics*

Patricia Nelson

### *B.A./M.A. in Mathematics*

Jean Margaret Dickson  
Jane Gumbiner

*M.A. in Mathematics*  
Naeem Ahmad  
Paula Oberste-Vorth  
Yigang Zhou

*Ph.D. in Mathematics*  
Hongzhu Qiao  
Ruiming Zhang

## MATH MAJOR WINS KING-O'NEAL AWARD

Mathematics Major, Suzanne Joseph, now Mrs. David Dawson, was one of eight students who received a bachelor's degree from USF in May 1993 with a 4.00 grade point average. Each of these students won the King-O'Neal Award, an honor given by the USF Alumni Association to the student or students who graduate with the highest grade point average. Suzanne, who came to USF from Springstead High School in Spring Hill, graduated with a double major in Mathematics and Mathematics Education. She won a Department of Mathematics Scholarship in 1991, and was the Outstanding Scholar of Pi Mu Epsilon in 1992.

Suzanne and David Dawson were married soon after graduation. David graduated from USF with a bachelor's degree in Electrical Engineering and is now a research and development engineer with Innovative Technology Corporation. Suzanne was granted a University Graduate Fellowship which allows her to study full-time toward the Masters' Degree in Mathematics. She expects to graduate in May 1994. She will then teach in junior high or middle school as a condition of her student loan. Eventually, she wants to teach in a junior or community college to prepare

herself to teach overseas as a missionary.

By our count, Suzanne is the fifth mathematics major to graduate Summa Cum Laude (records at USF are scanty). We are very proud of her and wish her a future commensurate with the promise of her past.

## CENTER FOR MATHEMATICAL SERVICES

Last summer, the Center conducted three programs for gifted high school and secondary school students in the Tampa Bay area. The "Mathematics and Engineering Program" was directed by Dr. Joseph Liang, with Drs. S. Campbell and R.K. Nagle instructing. It had 25 first-year students, 16 second-year, and 3 third-year. The following students received an Award of Overall Excellence: Caroline Humphrey, Plant City H.S.; David Watkins, Bloomingdale H.S.; and Miriam Goldstein, Berkeley Prep. The "Biomedical and Life Science Program" was directed by Dr. Marvin Alvarez in Biology, with Drs. R. Potter and D. Dunigan instructing. It had 28 first-year students, 9 second-year, and 3 third-year. Joseph Thomas, Cardinal Mooney H.S. and Anish Zachariah, Tampa Prep received an Award of Overall Excellence. The junior high "Mathematics and Science Program" was directed by Dr. M.N. Manougian with Drs. R. Clapp, M. Defant, A.N.V. Rao and Mrs. Margaret Yoder instructing. Mr. Todd Piersall and Mr. Peter Kovac assisted. It had 57 first-year students and 26 second-year students. The following students received an Award of

interests include softball and jogging.

Dr. Nagle received his B.S. in Mathematics from the University of Michigan in 1968, and his M.A. in 1969. Drafted into the Army in 1969, he spent two years as an applied mathematician at Aberdeen Proving Grounds. There, he used time series analysis to study vibration data obtained from tests on tanks. He returned to the University of Michigan and received his Ph.D. in 1975. He taught as a lecturer at the University of Michigan-Dearborn from 1972 until graduation in 1975, after which he became an Assistant Professor there. In 1976, he came to the University of South Florida. He was promoted to Associate Professor in 1980, and to Full Professor in 1991. He received two awards from the College of Natural Sciences -- the Outstanding Assistant Professor Award in 1980, and the Distinguished Teacher Award in 1985. He is a co-author of a Differential Equations textbook with Professor Ed Saff.

Dr. Nagle's background is in the area of nonlinear functional analysis and nonlinear differential equations. He obtained most of his knowledge on differential equations while working on his dissertation under the supervision of Professor Lamberto Cesari. After coming to USF, he became interested in nonlinear elliptic partial differential equations. He has authored nearly twenty papers. Dr. Nagle has supervised two Ph.D. students -- Karen Singkofer in 1979, and Zachariah Sinkala in 1989. He is currently supervising a

student in nonlinear differential equations. Dr. Nagle has also supervised the Master's theses of Paul Artola and Scott Goodwyn.

Dr. Nagle became the Associate Director of the Center for Mathematical Services in 1979, and its Director in 1984. Dr. Nagle also coordinates a lecture series entitled "Mathematics in Today's World", and has given over 290 lectures to secondary school students. This series is sponsored by the Center for Excellence in Mathematics, Science, Computers and Technology and the Greater Tampa Chamber of Commerce. Each summer since 1979, he has taught linear algebra to gifted high school students in the USF-Mathematics and Engineering Program.

## CHAIRMAN'S COMMENTS

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written form. This need to communicate arises in technical discussions with team members, presentations to groups, and written documentation on methods and results. Fourth, Mr. Kalman states that a general knowledge of a broad spectrum of mathematics is necessary for his work. This general knowledge from subjects as real analysis, differential equations, linear algebra, probability, and statistics comes mostly from a solid undergraduate training in mathematics.

Most strikingly, Kalman emphasizes the methodological training of a mathematics education as important. Included in this methodological training are

the following aspects: problem solving skills, ability to be self-critical (to be skeptical, distrustful of the seemingly obvious, and to constantly search for hidden errors and oversights), organizational skills (organization of knowledge and action), and the ability to recognize proofs and nonproofs (vigilance about false conjectures or incorrect deductions).

These observations by Mr. Kalman have a number of implications for mathematical education. First, a good general, foundational background in mathematics including courses in analysis, algebra, differential equations, numerical analysis, and so forth is important rather than early specialization at the undergraduate level. Second, methodological skills as listed above may be as important or more important than knowledge about specific mathematical subjects beyond the foundations. Third, mathematical training must include the learning of skills not ordinarily associated with training in mathematics. These skills include communication and writing skills, the ability to work in a team on group projects, and the ability to be a lifelong learner and be self-directed in the pursuit of knowledge.

Regarding the latter, Mr. Kalman makes a significant observation. "My education also prepared me to be self-educating and to face the prospect of independently mastering new mathematical subjects with confidence. The quality commonly referred to as mathematical maturity plays a nontrivial role. Because I am completely at ease with the organization and syntax of



Overall Excellence: Alex Goldstein, Hillel School and Daniel Neill, Hillsborough H.S.

Last year in the "Lectures on Mathematics in Today's World" lecture program we gave 108 lectures to approximately 4,411 students in the neighboring 8 counties. USF lecturers included: Drs. R. Darling, G. McColm, R.K. Nagle, K. Pothoven, C. Williams, and F. Zerla. This program is sponsored by a subgrant from the Center for Excellence in Mathematics, Science, Computers, and Technology. The 1993-1994 lecture program has started. Contact Maureen Kearsse at (813) 974-4068 to schedule a free lecture.

### INSTITUTE FOR CONSTRUCTIVE MATHEMATICS

The Institute for Constructive Mathematics received two grants from Hercules Defense Electronic Systems, Inc. of Clearwater, one for Signature Data Discriminator Analysis, the other for a Neural Network Discriminator. Dr. J. Pedersen was Principal Investigator on both grants, and Dr. E.B. Saff was co-Principal Investigator. Both grants involved research on applying wavelet decomposition methods to different domains, further developing previous Institute work on wavelet decomposition for image compression. In the Signature Data project, a limited number of one-dimensional signals were subsampled. Wavelet transformations were applied to attempt differentiation between event types represented in the subsamples. It was shown that wavelet preprocessing, followed

by training of a cascade-correlation neural network, could successfully discriminate between pairs of event types. The other project involved a much larger sample set, although each sample was smaller. Classification of a sample into one of several categories was required. Again preprocessing by wavelet transformation led to the construction of neural networks which were successful in most of the classification tasks.

### MAA NEWS

The annual Suncoast Regional Meeting of the Florida Section of the MAA will be held at Manatee Community College, South Campus, in Venice. Professor Marjorie Thrall is coordinating the event with the able assistance of USF graduates Catherine Panik and John Waters. The meeting will be held on Friday afternoon, December 3, 1993, concluding with a dinner that evening. Participants from the University of South Florida include Kenneth Pothoven, Gregory McColm and Fredric Zerla.

Plans are being made for the annual meeting of the Florida Section of the MAA at Daytona Beach Community College on February 25 & 25, 1994. Students, teachers and just people who enjoy mathematics are encouraged to take advantage of this statewide meeting.

For more information on either meeting, contact Fredric Zerla, Department of Mathematics.

### STUDENT CLUBS

Michael Pippin, Crystal Brandon and Christopher Miller constitute the Officer Corps of The Florida Epsilon Chapter of the Mathematical Association of America. As President of Pi Mu Epsilon, Michael Pippin addressed the first joint meeting on "Geometric Inequalities". Mike and Crystal used the second meeting as a social "Fun and (Mathematical) Games" time to encourage social interaction on a mathematical level. At the third meeting, Dr. Marcelle Bessman of the University of Maryland showed how the graphing calculator and certain computer programs can be used to great advantage in the lower-level mathematics courses.

### ALUMNI NEWS

Mary McClendon (Ph.D. 1989) is currently the Supervisor of Mathematics for Grades K-12 for the School Board of Sarasota County. She has become a first-time horse owner, and feels that riding and other chores related to her new hobby are very stress-relieving.

Cathy Panik (M.A. 1989) is currently an Assistant Professor at Manatee Community College, South Campus. On January 26, 1993, Cathy and her husband became the parents of a baby girl (Rose Christine).

### FACULTY PROFILE

Dr. Kent Nagle was born in 1947, and grew up in the Detroit area. He is married to Sandy, and they have two sons; Kevin, 11 years old, and Jeffrey, 5 years old. Dr. Nagle's outside

mathematical exposition, and because I have been trained to extract a conceptual understanding from expositions of

this type, every mathematical subject is open to me." I trust that the mathematics students

graduating from USF can say the same.

## FALL COLLOQUIA

Open Problems in the Theory of Probability on a Hyper-Group, presented by Professor Herbert Heyer of the University of Tübingen, Germany.

Global Optimization of Dynamic Systems with Constraints, presented by Professor Serguei Savastiouk of the Russian Academy of Sciences.