



Quaternion

Department of Mathematics Newsletter

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Chairman's Comments

KUDOS to a group of mathematics faculty who recently joined together to secure an NSF grant for the purchase of computer equipment. They are Professors M. Ismail, G. McColm, J. Pedersen, R. Stark, and C. Williams. Together with USF matching funds the grant totals \$60,000.

The grant will be used to purchase equipment for use in the research activities of the faculty. Five research areas formed the focus of the proposal. These research areas are diverse in that they include classical analysis (special functions, orthogonal polynomials), theoretical computer science (dynamic distributed systems, the word problem in non-absorbing varieties, distributed processing), and dynamics (hamiltonian systems). Yet they are unified in that each research effort is a symbiosis of mathematical theory and computer-based computation, simulation, and experimentation. Moreover, in each research area machine computations are needed that are either algebraic computations of great complexity or non-numerical simulations.

Purchased with the grant will be a Sun fileserver and several workstations and terminals together with appropriate software. The equipment will augment existing Departmental equipment

and will be connected via an ethernet network. The grant has served as a catalyst to enhance Departmental computer resources. Funds are currently being sought to extend the network to connect up to twenty faculty offices and to connect the network to the SURANET network.

New Faculty

The Department of Mathematics welcomes two new faculty to its staff. They are Drs. Ralph Oberste-Vorth and Vilmos Totik.

Dr. Oberste-Vorth is an Assistant Professor of Mathematics and comes to USF from Yale University. Since receiving his Ph.D. degree from Cornell University in 1987 under the direction of Professor J. Hubbard, Dr. Oberste-Vorth was a member of the Institute for Advanced Study at Princeton during 1987-1988, and an Associate Research Scientist at Yale University during 1988-1989.

His research interests are in the areas of dynamical systems and complex analysis. More specifically, he is interested in the dynamics of analytic mappings of two complex variables and families of such mappings which depend on complex parameters.

Dr. Totik comes to USF from Szeged University in Hungary. He received his Doctorate of Mathematical Sciences from the

Hungarian Academy of Sciences in 1986. He will be serving on a joint appointment with USF and Szeged University and will be at USF for one semester each academic year. He is a Full Professor at both Universities.

Dr. Totik holds a Chair in Logic in the Mathematics Department at Szeged University and works in the areas on combinatorics, logic, and analysis. He serves on the editorial board of three journals: *Journal of Approximation Theory*, *Analysis Mathematica*, and *Acta Scientiarum Mathematicarum*. He has published about 100 papers and a research monograph (*Moduli of Smoothness*) and has another monograph in progress. Professor Totik has won many mathematical prizes during his research career. He was a Visiting Professor at USF during the academic year 1987-1988.

Faculty Profile

Arunava Mukherjea was born in India and had his basic mathematical training there. He received his Bachelor's Degree (with first class honours) in Math and his Master's Degree in Applied Math (with a special paper in fluid-dynamics) in India. He received his Ph.D. from Wayne State University at Detroit in the area of Probability and Analysis. He has been teaching at USF for over 20 years.

His present research interests gradually took shape after he had joined USF, first in problems of random walks and stable distributions on various algebraic structures during the 1970's, and then in non-homogeneous Markov chains and random matrices, random transformations, and parameter identification problems in multi-variate analysis during the 1980's. He has published over 65 research papers. His Springer research monograph (co-author: Tserpes) appeared in 1976, and has been a standard reference in the area of random walks on semigroups ever since. His text *Real and Functional Analysis* (2 volumes, 2 editions, co-author: Pothoven) was called by the American Mathematical Society Math Reviews "a first-class text ... remarkably well-planned and written".

Dr. Mukherjea has often been invited to speak at various conferences, the most recent being at the 1989 AMS Short Course on Matrix Theory & Applications at its annual meeting at Phoenix, and at the 1989 Finnish Summer School of Probability held at the University of Helsinki's conference center. He is the editor-in-chief of the (PLENUM) *Journal of Theoretical Probability*. He was the recipient of the 1983 USF Distinguished Scholar Award. Throughout his career at USF, he has been consistently involved in the graduate program and has directed the Ph.D. dissertations of nine students. To Dr. Mukherjea, the most exciting aspect of teaching occurs when a paper is published in a premier research journal with a student to whom you taught the basics of the subject.

He has obtained several NSF research grants. He feels that some of the strongest moments in

his career occurred when he was able to give fairly complete solutions of problems only partially solved by some of the most powerful probabilists of our time such as Kesten, Spitzer, Rosenblatt, Kingman, and T.W. Anderson.

Dr. Mukherjea's best papers, he says, are perhaps his 1980 *Mathematische Zeitschrift* paper on random walks on matrices (with Goran Hognas) and his 1987 *Trans. Amer. Math. Soc.* paper on random matrices. His best known result is, however, about the mass of a random walk escaping to infinity in a non-compact group (*Z. Wahrscheinlichkeits-theorie* 1976).

Departmental News

Dr. R. Darling received the USF Alumni Professor award for 1989.

Dr. Darling also attended the AMS-SIAM Summer Seminar on Random Media in Blacksburg, Virginia during May 29-June 9, and on June 22, he gave a seminar on "Stochastic Compartmental Models" at the Nuclear Medicine Department of the Bay Pines V. A. Hospital. During August 16-19, he attended the Symposium on Applied Probability at Sheffield, United Kingdom and contributed a paper entitled "Products of Infinite-Dimensional Random Matrices", and from September 21-22, he attended the Dosimetry of Administered Radionuclides Symposium in Washington, D.C.

Dr. Carol Williams has been promoted to Full Professor of mathematics.

Dr. A. Goodman gave a talk on Chromatic Graphs at the University of Central Florida on November 14.

Dr. M. Ismail along with Paul Nevai and Dennis Stanton co-organized a NATO Advanced Study Institute held in Columbus, Ohio during May 22-June 3.

Dr. Ismail also gave an invited talk in a special session on the history of orthogonal polynomials at the summer meeting of the AMS in Boulder during August, and gave colloquium talks at the University of Delaware, Newark on October 30 and at Drexel University on November 1. He has received a NATO ASI grant, an NSF grant, and an IMA grant for the Ohio State conference, and with Professor E. Saff has been awarded an NSF 3-year operating research grant, an NSF special year grant, and an NSF additional research grant for collaborative research.

Dr. G. McCOLM attended the Logic in Computer Science Conference at Asilomar, Carmel, California in June.

Dr. A. Mukherjea was one of four principal speakers at the 1989 Finnish Summer School of Probability at Lahti, Finland during June 12-16.

Dr. K. Nagle spoke on "Semilinear Equations at Resonance where the Kernel has Dimension Two" (joint work with Z. Sinkala) at the International Conference of Differential Equations: Theory and Applications in Stability and Control at Colorado Springs in June. In August, he attended the NSF workshop on "Uses of Electronic Technology in the Undergraduate Mathematics Curriculum" at Oklahoma State University in Stillwater. In October, Dr. Nagle presented a talk at the Southeastern Atlantic Regional Conference on Differential Equations in Charlotte, and gave a colloquium

talk at the University of Central Florida.

Dr. M. Parrott gave a talk at the Southeast Atlantic Regional Conference on Differential Equations in Charlotte during October 13-14.

Dr. K. Ramachandran gave an invited presentation entitled "On Random Differential Delay Equations with a Small Parameter" at the AMS-SIAM summer conference on Mathematics of Random Media held at Virginia Polytechnic Institute during May 29 - June 10. He also gave an invited presentation entitled "Stochastic Stability of a Delay Differential Equation with a Small Parameter" at the conference on Diffusion Processes and Related Problems in Analysis at Northwestern University during October 23-27.

Student News

B.A. in Mathematics

Ben Calderone, Henry Corwin, Janet Sibol (Cum Laude), Roger Sill, Blake Baietto, Jennifer Carito, Da-Yung Chang, Susan Irick, Byron Johnson, David Lowell, Mary Mertes (INS Major), Marial Rametta (Cum Laude), Kathleen Holmes Rosaly, and Gretchen Timmer.

M.A. in Mathematics

Kurt Long, Gwiyeon Shim, John Wilhelm, Jinyong Chen, Kan Liu, Catherine Panik, Cid Praderas, Philip Wing, and Margaret Yoder.

Ph.D. in Mathematics

--- Chi-Chang Lo, "*Weak Convergence in $d \times d$ Bistochastic Matrices and Other Semigroups*"; Major Professor, A. Mukherjea.

--- Li-Chen Chen, "*On Asymptotics of Certain Hypergeometric Functions and $6-j$ Symbols*"; Major Professor, M. Ismail.

--- Xin Liu, "*Topics in Approximation Theory*"; Major

Professor, E. Saff.

--- Zachariah Sinkala, "*Existence of Solutions to Boundary Value Problems for Nonlinear Systems of Ordinary Differential Equations at Resonance*"; Major Professor K. Nagle.

USF Junior Tina Tremmel was awarded a \$1,000 Faculty-Staff Scholarship for 1989. Tina is a mathematics major and carries a 3.839 grade point average.

CMS NEWS

The summer programs conducted by the Center for Mathematical Services for gifted students had the largest enrollment ever, with 241 students entering one of the five programs on the Tampa and St. Petersburg campuses.

One of the goals of the summer program is to encourage students to attend USF. The University allows CMS to present a USF freshman scholarship to the best student in the high school programs. This summer the recipient was Clifford Henderson. The three students named as first, second, and third alternates are in order, Jennifer Allen, John Lee, and Chester Kam.

Starting with the next academic year, the University has provided a new four-year special scholarship available only to students who have participated in the summer programs. It is planned to provide each student chosen a total of \$8,000 (\$2,000 per year for four years). Application forms are being prepared now. Former students of the summer programs who are interested in applying should contact: Dr. R. Kent Nagle, Director, Center for Mathematical Services, University of South Florida, Tampa, Florida 33620-5700.

The Center is planning to hold a reunion for alumni of the summer programs and their friends late in January, 1990. The reunion will be held for every summer program since the first one in 1979. There will be an illustrated lecture presented by Dr. Carol Williams on the Exploration of the Solar System, visits to science labs, and an opportunity at lunch to visit informally with faculty of the program, review old acquaintances, and share experiences with old friends.

MAA News

The Fourteenth Annual Suncoast Regional meeting of the Florida Section of the MAA will be held at Manatee Community College in Bradenton on Friday afternoon, December 8, 1989. The Conference Coordinator is William A. Savage of the MCC Mathematics Department. The USF participation in this meeting include Dr. Don Lichtenberg of Mathematics Education who will give the main address. Half hour talks will be given by Dr. Fredric Zerla, Mathematics Department, on "Galileo's Paradoxes: An Inquiry into Infinitesimals," Dr. E. Ray Phillips, Mathematics Education, on "Challenges: Teaching Algebra," Robert Flynn, Physics Department, on "Solving Three-Clock Relativity Problems." These regional meetings are intended to provide teachers of mathematics from junior high to graduate school a place to meet to talk mathematics. The program begins at 3:15 p.m., and concludes with a dinner. For the Details, contact Professor Savage at (813)755-1511, #4224.

Student Clubs

The Florida Epsilon Chapter of Pi Mu Epsilon and the USF Student Chapter of the MAA have met

jointly this semester. At the first meeting, Todd Piersall, President of Pi Mu Epsilon, spoke on "An Introduction to Coding Theory," an exciting new application of the ancient art of Number Theory. The second meeting featured Professor Arunava Mukherjea's discussion of "Identification of Parameters by the Distribution of the Maximum." In mid-October, we were invited by the Sigma Xi Society of Eckerd College to attend talks by Judith V. Grabiner, Professor of Mathematics and the History of Science at Pitzer College, California. Professor Grabiner spoke twice, first on Descartes' work, then, in a formal presentation to Sigma Xi, on "From Physics to Philosophy: How Mathematics Gave Rise to Modern Science." The third USF meeting featured USF alumna Dr. Deborah Levinson, now an Assistant Professor in Industrial Engineering and a Research Associate for Shriners' Hospital. Dr. Levinson told of her work as the mathematician on a team determining "A Shape Analysis of the Human Wrist." The fourth presentation featured Gregory Henderson of the University of Tampa, a doctoral student at USF. Professor Henderson presented a proof by Ivan Niven on the irrationality of pi. The semester's activities will conclude with a talk introducing Professor Ralph Oberste-Vorth who is new to USF

this year. Dr. Oberste-Vorth is a recent graduate of Cornell.

Florida Power & Light Grant

A team at the Institute for Constructive Mathematics (Drs. Darling and Saff, together with graduate research assistants Godfrey and Moscatello) have a grant from Florida Power and Light Company during 1989 to study the probabilities of high wind speeds and surge elevations arising from hurricanes in the vicinity of power plants in Southeast Florida. Although meteorologists have studied hurricanes extensively, including their statistical aspects, it has been necessary to develop new statistical techniques to estimate the extremely low probabilities of very high winds. Leading hurricane experts from the National Hurricane Center, M.I.T., and elsewhere are contributing their knowledge to this project.

Alumni News

--- Michael Lachance Ph.D., 1979. Recently promoted to the rank of Full Professor with tenure, at the University of Michigan, Dearborn, MI. His research is in the areas of approximation theory and curve-surface representations in computer aided design.

--- Karen (Singkofer) Rael Ph.D., 1979. Welcomed her second child into the world last winter. She is now at General Research Corporation, Westlake Village, CA

--- George Mead Ph.D., 1981. Associate Professor and Head of the Department of Mathematics, Statistics, and Computer Science at McNeese State University in Lake Charles, LA

--- Richard Stevens Ph.D., 1986. Assistant Professor of Mathematics and member of the graduate faculty at Western Carolina University, Cullowhee, NC. Richard taught in China in the spring of 1988. He has published papers in multivariate analysis, statistics, and topology.

--- Debby Levinson Ph.D., 1988. Adjunct Assistant Professor in the College of Engineering at USF. She is part of a team of engineers, medical doctors, and computer scientists working on a research project involving the dynamics of the human wrist.

--- Zachariah Sinkala Ph.D., 1989. Assistant Professor of Mathematics at the University of Central Florida.

--- Chi-Chang Lo Ph.D., 1989. Assistant Professor of Mathematics at Clearwater Christian College.

--- Li-Chen Chen Ph.D., 1989. Assistant Professor of Mathematics at Beloit College, Beloit, WI

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