



Quaternion

Department of Mathematics Newsletter

Volume 6, Number 2

Spring 1990

Chairman's Comments

Every five years the Board of Regents of the State of Florida conducts a review of each discipline in the State University System. This year each mathematics department in the State University System was reviewed.

Prior to the formal review by a team of out-of-state mathematics consultants, each department was asked to prepare a self-study for the consultants to use. This gave each department a chance to take a careful look at itself and examine what progress and changes had been made in the preceding five years.

Here are ten items which stand out as improvements and changes within the past five years at USF: (1) Eight new faculty in the Department; (2) A tenfold increase in research related grants and contracts; (3) A twofold increase in the number of graduate students; (4) Two new research journals with chief editorial offices in the Department; (5) A new Institute for Constructive Mathematics created within the Department; (6) A new undergraduate honors program in mathematics and an innovative Accelerated BA/MA Program created in the Department; (7) 16 Ph.D. graduates produced from

1984-1989; (8) Faculty exchange programs established with institutions in China and Bulgaria; (9) Expanded summer programs for gifted secondary students in local counties with funding up 66% since 1985; and (10) Much improved computer facilities within the Department with the addition of SUN workstations and networking.

The formal report is currently being prepared by the review team. The Department looks forward to positive recommendations and suggestions for further improvements.

US-USSR Conference on Approximation Theory

The first joint US-Soviet meeting on the subject of approximation theory was held on the USF campus March 19-23. Prof. E. B. Saff of the USF Mathematics Department and Prof. A. A. Gonchar of the Steklov Institute in Moscow were the principal organizers of the conference, which featured lectures by 18 prominent Soviet mathematicians and was attended by 163 mathematicians from 18 different countries. The local organizing committee consisted of M. Ismail (chairman), V. Totik, B. Shekhtman, M. Parrott, and C. Williams. The conference was a highlight of the current **Special Year In Approximation**

Theory at USF, a project conducted by the Institute for Constructive Mathematics and primarily supported by the National Science Foundation. The conference proceedings will be published by Springer-Verlag. A follow-up conference is currently planned for Leningrad in May, 1991.

The Astronomy Program

Since the fall of 1979, the Mathematics Department has been the home of USF's Astronomy Program. It happened when Carol Williams, the program's Director, transferred from the old Astronomy Department (that had been at USF until 1979) into the Mathematics Department. Besides Williams, three other astronomers are at USF: Joseph A. Carr, Director of the USF Planetarium, Jack H. Robinson, Professor of Educational Measurement and Research on the Bay Campus, and Gordon Hammond, who holds a courtesy appointment in mathematics. Both Director Carr and Professor Robinson will retire this year and with their retirement, the Astronomy Program will lose 2/3 of its teaching staff.

Joe Carr came to USF in August 1960 and was here to see the first class enter the campus that

September. The Planetarium was installed nearly four years later, in March, 1964. The first three lectures in the Planetarium were given by John Allen, first President of USF (who himself was an Astronomer) and by Dr. Armond Spitz, President of the corporation that built the instrument. While these two gentlemen lectured, Mr. Carr operated the controls. Serving not only the USF campus, but also the general public, Mr. Carr is host to more than 10,000 people every year. The Planetarium celebrated its 25th birthday last year. This fall, when Joe Carr retires, it will close.

Mr. Carr developed his course *Illustrative Astronomy* as part of the instructional program in Physical Science, where he was a member of the teaching faculty. When the Planetarium was installed, the course was adapted to be taught in that facility. The course is much more than an introductory astronomy course. Students receive specialized instruction in optical instruments, meteorite science, and the weather--areas not ordinarily covered in depth in most elementary courses. Having worked in optical and electronic instruments all his life, Mr. Carr is particularly well qualified to teach students about astronomical instruments. In addition, he is a licensed gemologist and owns a nice collection of meteorite samples. When put together with the University's pieces, it becomes a rather large and informative collection. Thus, the students receive unique instruction in meteorite science. Similarly, his course includes an informative section on the weather, a subject which most optical astronomers must learn. This course has been very popular for many years, filling the planetarium every semester with students waiting in lines in case a seat becomes available. We shall miss his course and hope that he might return to teach it from time to time after he retires.

Jack H. Robinson started at USF in the Physical Science Program. Even though he is now a member of the Department of Educational Measurement, he is also an accomplished professional astronomer. He taught astronomy courses on the Bay Campus when USF had an Astronomy Department in Tampa. In 1979, when the Department was transferred to the University of Florida, he was asked to start teaching astronomy courses on the Tampa campus as well. Because of his professional expertise in science education and his dedication to teaching, Jack Robinson has consistently been an outstanding astronomy teacher. Out of his research in the field of archaeoastronomy, Dr. Robinson developed the course *Archaeoastronomy*. He was one of the first astronomers anywhere to develop such a course; many other astronomers have discussed the course with him and used some of his ideas. He is a member of the American Astronomical Society and of its Historical Astronomy Division, and is on the Editorial Board of the *Journal for the History of Astronomy*. He has published several papers and given many talks at national and international meetings on archaeoastronomy. One of his papers was given special attention in a front page article of *The Times* of London! When Dr. Robinson retires this Spring, we will lose this unique course, offered in only a very few universities. We hope that in addition to pursuing his research full time, which he is looking forward to, Jack Robinson will be able to return to teach USF students from time to time.

Departmental News

Dr. E. Clark presented a paper on "Blocking Sets in Finite Projective Spaces and Uneven Binary Codes" at the Southeastern Conference on Combinatorics, Graph Theory, and Computing during February 12-16. Dr. Clark also attended the annual meeting of the American

Mathematics Society in Louisville, the Summer Meeting of the AMS in Boulder, Colorado, an AMS short course on Cryptography and Number Theory in Boulder, and an MAA mini-course on Dynamical Systems in Boulder.

Dr. R. Darling gave an invited lecture entitled "Random Monotone Functions of Sets" on February 18 at the Ulam Quarterly Inaugural Conference at West Palm Beach. On March 15 at the SIAM Conference on Applied Probability in New Orleans he contributed a paper on "A Probability Model for the Intensity of Atlantic Tropical Cyclones." On March 16 at the Conference on Stochastic Flows in Charlotte, Dr. Darling gave an invited lecture entitled "Stochastic Flows on a Countable Set."

Dr. M. Ismail gave colloquium talks at York University in Toronto in December, and at the University of Missouri in St. Louis and Carleton University in Ottawa in February. Dr. Ismail assisted Paul Neval in the publication of "Orthogonal Polynomials: Theory and Practice," published in cooperation with the NATO Scientific Affairs Division. He also attended the Special Session on Classical Analysis at the Winter Meeting of the Canadian Mathematics Society in Montreal during December.

Dr. M. McWaters presented a short course on "Implementing a Computer Based Mathematics Laboratory to Supplement Classroom Instruction" at the MAA annual sectional meeting of the Louisiana-Mississippi section.

Dr. A. Mukherjea gave invited talks at Palm Beach Atlantic College on February 16, at the Conference on Stochastic Flows and Random Matrices at the University of North Carolina at Charlotte on March 16, and at the Statistics Department of Florida State University on April 12.

Dr. M. Parrott received an NSF/AWM travel grant to attend and present a talk at the International Conference on Differential Equations and Applications to Biology and Population Dynamics during January 10-13 at Claremont, California.

Dr. J. Pedersen gave an address on "Cellular Automata on Algebraic Systems" at the 21st International Southeast Conference on Combinatorics, Graph Theory, and Computing held in Boca Raton February 12-16. He also spoke on "Decidability of Equivalence Relations" at the 6th Southeast Logic Symposium at Miami on March 10-11. Dr. Pedersen is the recipient of a one year research and creative scholarship grant for "Equivalent Axiomatization of Algebraic Systems"

Dr. K. Ramachandran presented a paper entitled "Nearly Optimal Controls for Delay Differential Equations with a Small Parameter" at the SIAM Conference on Applied Probability in Science and Engineering in New Orleans during March 5-7. On March 8 he gave an invited talk on "Some Weak Convergence Methods" at Louisiana State University.

Dr. E. Saff has been appointed to the Southeastern Section Program Committee of the AMS.

Dr. W. Stark gave a presentation at the annual Southeast Logic Conference. Dr. Stark also is the author of a book entitled "LISP, Lore, and Logic" published by Springer.

Student News

Spring, 1990 Graduates

B.A. in Mathematics

Amaden, Christopher
Carnegie, John
Cronin, Stephen
Curry, Robert
Harvey, Kalynn
Jenks, Dorothy
Maccow, Magne
Magin, Steve
Messer, Marna
Moriarty, Robert
Phillips, Susan
Piersall, Todd
Robertson, K. Beth
Rowell, Gene
Ryan, John
Scarborough, Michelle
Shaprio, Bradley
Thompson, Lorida
Timreck, Stella
Wilder, William

Wilson, Theresa

M. A. in Mathematics

DiCroce, Peter
Gong, Jianjian
Ishak, Riadh
Piersall, Todd
Qiao, Hongzhu
Wilder, William

Ph.D. in Mathematics

Ki-yeon Shin "Zeros of M-Accretive Operators and Abstract Evolution Equations in Banach Spaces" (Prof. A. Kartsatos)

MAA News

The twenty-third Annual Meeting of the Florida Section of the Mathematical Association of America was held at Valencia Community College in Orlando on March 2 and 3. Among the speakers were Professors Ivan Niven and Peter Hilton, the past president and past first vice president of MAA respectively, and Warren Page, former editor of The College Mathematics Journal and second vice president of the MAA. Those attending from USF included Dr. Kenneth Pothoven, who participated in the Meeting of College Chairs, and Dr. Fredric Zerla, who presided at the Student Paper Session. Dr. Zerla is State Coordinator of Student Chapters for the MAA news. Todd Piersall, who completed both a B.A. and M.A. in Mathematics this year, spoke on, "An Introduction to p-Adic Numbers."

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 Anh Vu Nguyen, President of the Student Chapter and an engineering major, spoke on "The Application of Integral Calculus in Deriving Formulas in Physics". The second meeting featured Classics Professor Sara Mandell's discussion of "Mathematics & Philosophy in Classical Times". At the third meeting, Professor

Carol Williams, the astronomer in the Mathematics Department, presented a talk entitled "A Brief History of Lunar Theory". Mathematics Professor Gregory L. McCole, whose specialties include combinatorics, mathematical logic and theoretical computing, spoke on "Definitely Difficult Computing" at the fourth meeting. The fifth meeting featured Philip Wing, doctoral student in mathematics, discussing "Error Detecting Codes: Try Base 11 and Live a Little". At the sixth meeting, Professor Kent Nagle drew on his knowledge of mathematical models in "A Good Guess and Some Hard Work - The Engineer's Approach to Solving Differential Equations As Seen By One Mathematician". The semester series of talks concluded with an address by Robert S. Moriarty, who was selected the Outstanding Scholar for Pi Mu Epsilon, 1990. Robert discussed "Game Theory: A View of Military Strategy". At the Pi Mu Epsilon Induction Banquet held on April 20, eighteen new members were welcomed into the Mathematics Honorary. With the Hillsborough Council of Teachers of Mathematics, the Student Clubs sponsored the Hillsborough County Math Bowl Competition on May 1 at the University Center. The 13 public high schools in the county were represented by approximately 200 teachers and students,

Florida High-tech and Industry Council Grant

A grant proposal submitted by Professors Saff, Liang, and Oberste-Vorth with the title *Applications of Fractal Based Image Processing* was funded by the State of Florida's High Technology and Industry Council.

The initial amount of support is \$20,000 for 12 months. Martin Marietta Electronics Systems in Orlando has committed additional support to this research effort.

The purpose of this project is as follows: (1) to compare existing algorithms for the computation of fractal dimension and develop theory for new techniques, in particular, to investigate the estimation of fractal dimension using projection techniques which will result in the reduction of computational complexity; (2) to conduct basic research to expand the knowledge base or the estimation of iterated function systems for a given image; (3) to study the relationship between cellular automata and fractals and to develop algorithms for approximating fractional Brownian motion; (4) to investigate the recently developed concept of "wavelets" in image processing.

The project has involved other interested faculty members and graduate students. Weekly seminars on both fractals and dynamical systems are being offered and experts in fractal geometry as well as speakers from industry will be invited to consult on research activities.

Computer News

In June, 1989 a team of six faculty (Kenneth Pothoven, Mourad Ismail, Gregory McColm, John Pedersen, W. Richard Stark and Carol Williams) received funding from the National

Science Foundation for their Mathematical Sciences Research Equipment grant proposal of \$30,000, matched by \$30,000 from the University of South Florida Division of Sponsored Research. The funds have been used to purchase four SparcStation 1's (20 MHz, 12.5 MIPS, 8 MB, diskless, 17" monitors) and one SparcStation 4/330 (25 MHz, 16 MIPS, 24 MB, 1 GB disk, 19" monitor) made by Sun Microsystems. These arrived in February 1990 and were linked together with Ethernet. They complemented two existing Sun 3/60 workstations in the Institute and Department.

Research proposed in the grant includes studies in special functions, mathematical modelling of hierarchical structures, symbolic solution of word problems in universal algebra, mathematics of distributed processes and algorithms for the study of long-term behavior of Hamiltonian systems. The researchers are now commencing these investigations. Software available on the system to help conduct the research includes a symbolic algebra package, C and Pascal compilers, and Common Lisp, as well as the many data analysis tools standardly available in the Unix operating system. For presenting and communicating

research results, the scientific typesetting program TeX is available. Also, the system has recently been connected to the Internet, providing the whole Department with electronic mail and remote file transfer and login facilities with other educational and scientific organizations worldwide.

The NSF grant was clearly a joint project, but special thanks go to Dr. John Pedersen who was primarily responsible for physically setting up the equipment, creating "Sun" accounts for staff members, and providing the written instructions for logging onto the Sun and for using EMAIL.

Alumni News

--- Paul Artola, BA 1980, MA 1985. Currently employed by the department of defense as a Senior Mathematician, and by the University of Maryland as an Adjunct Instructor of Computer Science. Paul programs and develops algorithms for the Department of Defense.

--- Catherine Panic, MA 1989. Currently an Instructor of Mathematics at Manatee Community College, South campus.

USF

Department of Mathematics
Tampa, Florida 33620-5700

Non-Profit Org. U.S. Postage PAID Permit No. 257 Tampa, Florida
