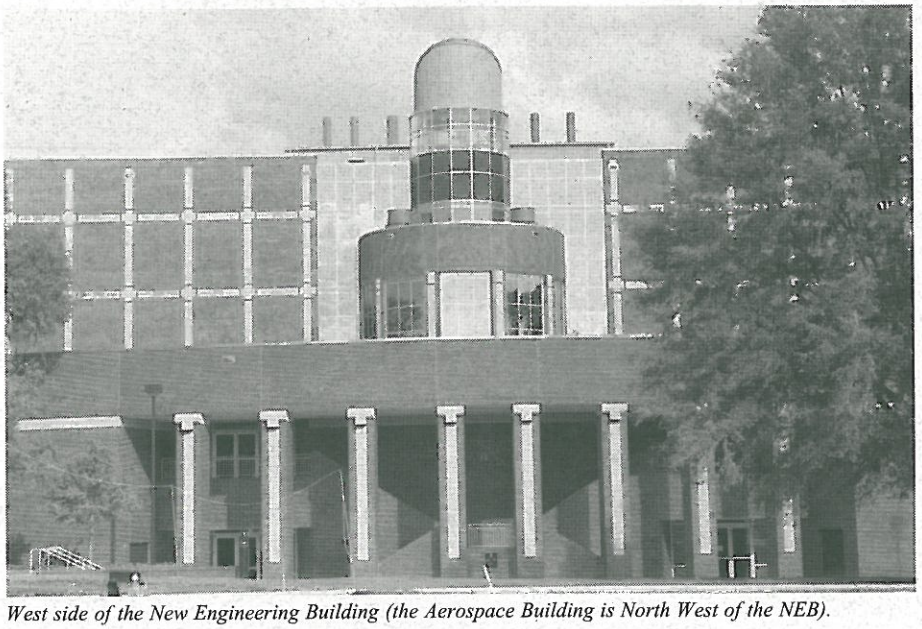
NEWSLETTER FOR ALUMNI, FRIENDS & STUDENTS

SPRING 1997

THE STREAMLINE

AEROSPACE ENGINEERING, MECHANICS & ENGINEERING SCIENCE

More Space for AeMES in New Engineering Building



West side of the New Engineering Building (the Aerospace Building is North West of the NEB).

> The College of Engineering (COE) will continue its "tradition of excellence, to be a first-quality COE, competing with and among the very best engineering colleges in the US and recognized as a world leader in engineering education, research and service."

The construction of the five-story, 135,000 square-foot, $19M, New Engineering Building (NEB), located just a few hundred yards southeast of the Aerospace Building, has recently been completed. The occupancy of the NEB has begun since its official dedication, held on 21 Feb '97, at this year's annual Engineering Advisory Council meeting. Three engineering departments share the space of the NEB: AeMES, Electrical and Computer Engineering, and Environmental Engineering.

In his acceptance speech for the NEB, Dean W. Phillips assured the audience that the College of Engineering (COE) will continue its "tradition of excellence, to be a first-quality COE, competing with and among the very best engineering colleges in the US and recognized as a world leader in engineering education, research and service."

The existence of the NEB is a result of the efforts by the COE and the university administration to provide the much needed space for the College's teaching and research activities. The annual research activity of the COE has increased from $18M in 1985-86 to $53M in 1995-96. The COE needed funds to develop adequate facilities, including computational facilities, new faculty offices, graduate student space and classrooms.

A proposal was made to the University, and a request sent to the Board of Regents (BOR) in July 1990. Subsequently, a survey team from the Florida Department of Education confirmed the need for more space. The Florida legislature and the BOR approved the construction of the NEB in 1993. The NEB received top priority for funding from the Public Education Capital Outlay (PECO) Trust fund, established from the Gross Receipts Utilities Tax to fund the State's education related equipment needs, including the public schools. The architect's plan was finalized in Spring '94. Construction of the NEB began two years ago, with the ground breaking ceremony organized at the annual Engineering Advisory Council meeting in Feb '95.

The AeMES department is assigned approximately 12,000 square feet of office and laboratory space in the NEB, resulting in a 50% increase in space available to us. Most of the AeMES space is on the ground floor, with a few offices and labs located on the second floor. There are offices for six faculty

Highlights

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Knox Millsaps Memorial Lecture in Fall '97 by Prof. J. Sobieski, Univ. Of Virginia (see page 4)

UNIVERSITY OF FLORIDA

Crowd attending dedication ceremony in NEB lobby.

members, several others for visiting faculty, and space for about 24 graduate students, along with a small service room and a conference room. Most of the ground floor space is devoted to our ten new research laboratory rooms and three teaching lab rooms. Undergraduate and graduate computer labs are located on the second floor.

East side of NEB: AeMES faculty offices are on ground floor, right of entrance, looking on Center Drive in front.

Electrical and Computer Engineering will occupy most of the second floor and all of the fourth and fifth floors, while Environmental Engineering is assigned all of the third floor.

The west wing of the building consists of a large auditorium (184 seats) and four large classrooms (75 to 100 seats) on two different levels. All rooms are equipped with state-of-the-art technologies (e.g., advanced multimedia equipment, motion detectors to turn on lights automatically, etc.). Two of the classrooms will be equipped for video recording and for video teleconferencing, which is facilitated by three cameras: Two cameras pointing toward the instructor and the chalkboard from the back of the room, and one camera pointing toward the audience from the chalkboard.

Dean W. Phillips accepting NEB at dedication ceremony.

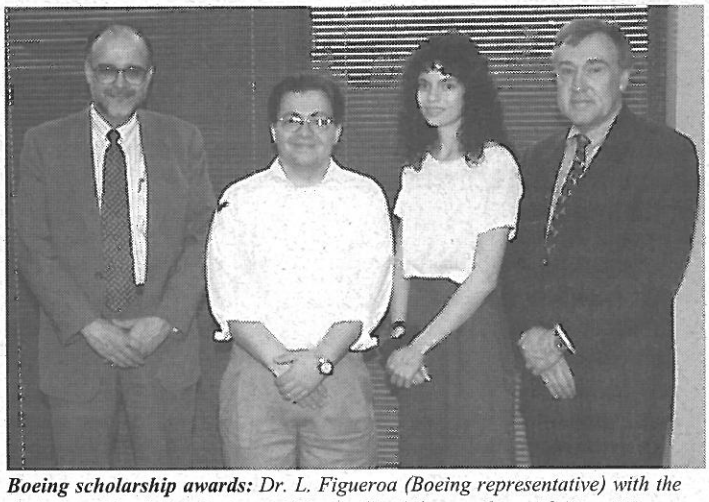
At present, plans have been made for the moving (to the NEB) of six AeMES faculty members, whose research interests are closely related, and who have been collaborating with each other on various research projects. Of course, all additional facilities for AeMES in the NEB are to be used by all AeMES students and faculty.

BOEING supports UF Aerospace

On 27 Feb '97, **Dr. Luis Figueroa** of the Boeing company visited the AeMES department, and met with several faculty in the morning. At a cordial luncheon on that day, Dr. Figueroa presented a scholarship to **Mr. Jimmy Rojas**, an AeMES undergraduate, a research grant to Prof. W. Shyy, AeMES Chair, and a check to support the activities of the local AIAA students chapter. Also present at the luncheon was Engineering Dean Win Phillips.

Even though coming all the way from Seattle, where Boeing has its headquarter, Dr. Figueroa is not unfamiliar with UF, nor is he unknown to UF faculty. He was on the UF EE faculty for two years, 1985-87, prior to joining Boeing. A graduate from UC Berkeley, Dr. Figueroa has had a long career in industry, interspersed with brief stints in academia, and culminating at his current position as Director of the Radio Frequency & Optical System Division, Boeing Defense & Space Group. In addition to his technical work, he is also the Boeing Executive Focal in charge of relations with UF, a post that he has held since April 1996. UF is currently the only Florida University that Boeing is maintaining a close partnership in support of Aerospace Engineering education. Dr. Figueroa is also a member of a Boeing University Relation Steering Committee (URSC) that makes decisions on the awarding of grants to universities.

Among the proposals submitted to the Boeing URSC by **Prof. W. Shyy and Assoc. Prof. N. Fitz-Coy** is a proposal on *Micro Aerial Vehicles* (mAV's) that caught the attention of the Boeing committee. Believing in the important potentials of mAV's, Boeing wanted to establish a technical partnership with the AeMES department, even though the company is not currently working in this area. Working with a team of AeMES faculty are Boeing's technical contacts Messrs M. Bantell and I. Hirsch, of the Flight Engineering



Boeing scholarship awards: *Dr. L. Figueroa (Boeing representative) with the recipients, Mr. Jimmy Rojas and Ms. Sophie Acle, together with Dean W. Phillips*

Organization. The Boeing research grant is to be used for mAV research by AeMES faculty and students, without restrictions. Boeing will bring Jimmy Rojas to Seattle for an internship in Summer '97. There, Jimmy will work within the Flight Engineering Organization, a great opportunity for Jimmy to acquire valuable skills.

Jimmy plans to use his scholarship to pay for part of his tuition at UF. He has been working 40 hours a week to pay for his tuition, an extremely heavy workload for a full-time student. The scholarship is of tremendous help to Jimmy in allowing him to reduce his workload to a more reasonable level of 20 hours a week. Jimmy is pursuing a study concentration on space science, and plans to graduate in May 1998. (Also receiving a Boeing scholarship was Ms. Sophia Acle, an ME undergraduate.)

In talking to Dr. Figueroa, we learn that Boeing's commercial airplanes business had been thriving, and heading toward the highest production in history. On the world market, Boeing competes very well with AirBus, a European consortium. The company has been doing good business with the sale of its new Boeing 777 airplane. By market demand, Boeing has put on hold the development of large commercial airplanes that could carry a thousand passengers or more. Instead, the company is developing a wide variety of aircraft models for several markets.

According to Dr. Figueroa, an important business development will be in space. With increasing demand for telecommunication satellites (television, cellular phones, etc.), Boeing has been involved in satellite launch operations. In partnership with NASA, Boeing will participate in the launch operations of the Space Shuttle, as NASA seeks to yield the management of such operations to private industry, in search for more economy and efficiency. In addition, Boeing has been developing its Sea-Launch program, aiming at launching rockets carrying satellites from floating sea platforms. The flexibility to bring the launch platforms to the Equator to save cost in launching rockets will give Boeing an economic edge in the satellite launching business over its international competitors having only land-base platforms that are not on the Equator.

Dr. Figueroa hopes that Boeing's partnership with AeMES will lead to more opportunities for joint collaborations and more AeMES students being hired by Boeing. An immediate potential joint collaboration being explored is the Integrated Product and Process Design (IPPD) program, which has been a thriving on-going program at UF, attracting the participation of several companies. (Representing the IPPD program at the award luncheon mentioned above was EE Assoc. Prof. W. Eisenstadt.)

We are looking forward to a continuing fruitful partnership with Boeing.

Dr. L. Figueroa presenting a grant to Prof. W. Shyy, with the presence of Dean W. Phillips

22nd G.I. Taylor Memorial Lecture

Dr. J.R. Rice

On 7 Mar '97, **Dr. James R. Rice**, Gordon McKay Professor of Engineering Science and Geophysics, Division of Engineering and Applied Sciences, and Department of Earth and Planetary Sciences, Harvard University, visited the AeMES department, and gave the 22nd G.I. Taylor Memorial Lecture entitled "*Strong but brittle faults and the problem of earthquake occurrence at low overall driving stress.*"

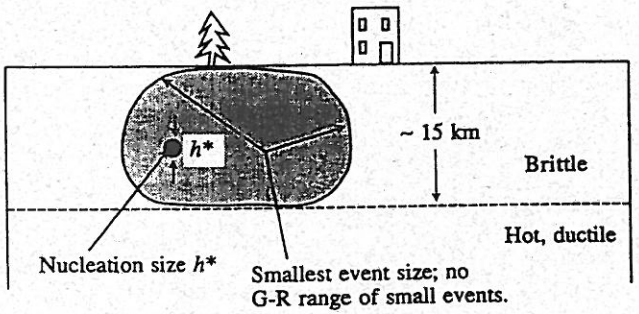
Dr. Rice's work in solid mechanics is well known in engineering and geophysics. In engineering, he has made seminal contributions to nonlinear fracture mechanics, in particular crack propagation in elastic-plastic metals. The J-integral that he developed is an established tool in fracture mechanics. This contribution earned him (at the age of 28) a Henry Hess Award of the American Society of Mechanical Engineers; this award is given to ASME members making outstanding contributions before the age of 30. In geophysics, he has contributed to the understanding of earthquake nucleation, factors controlling earthquake populations, stress formation and seismicity in the lithosphere (outer layer of the Earth, composed of rocks, with a thickness about 80 km), and poroelastic effects in fluid infiltrated earth materials. Dr. Rice serves on many national committees on Theoretical and Applied Mechanics and on Geoscience. He has received a long list of honors and awards; most notably are his elections to both the National Academy of Engineering and the National Academy of Science, when he was barely past the age of 40.

Prior to his seminar, Dr. Rice spent time to discuss on various research topics with AeMES faculty and graduate students. Dr. Rice had a long working relation with Emer. Grad. Res. Prof. D. Drucker. After receiving all three degrees (BS, MS, Ph.D.) from Lehigh University, Dr. Rice moved to Brown University in 1964 as a Postdoctoral Fellow, working under the guidance of Dr. Drucker, who was then at Brown University. (Dr. Rice's Ph.D. advisor at Lehigh was Prof. F. Beer, who co-wrote the popular books on Statics and Dynamics that we are using in our undergraduate courses.) Dr. Rice stayed on the faculty at Brown University until 1981, when he moved to Harvard. Among AeMES faculty, with the Brown connection, who knew Dr. Rice well are Emer. Prof. L. Malvern and Prof. E. Walsh. In the afternoon, after an hour meeting with AeMES graduate students, Dr. Rice gave his seminar on the application of fracture mechanics to the study of earthquakes.

According to laboratory results on friction in rocks, it appears that the shear strength of faults at the depth of 10 km, typical for the generation of earthquakes, should be of order 100 MPa. Yet, the lack of heat flow along the famous San Andreas fault—passing under Los Angeles and San Francisco, and responsible for the disastrous 1906 earthquake that destroyed San Francisco—in California suggests that the average stress doing work on slip is less than about 10 MPa. Also, field observations on the principal compressive stress direction in the nearby crust suggest that the average shear stress borne by the fault is of order 10 MPa. One solution is to appeal to broadly distributed regions of near-lithostatic pore pressure, or to anomalously weak fault-zone materials. Reasoning from the Griffith crack concept in fracture mechanics, Dr. Rice explores, however, an alternative explanation, in which the fault zones are considered as strong, but brittle, and subjected to local stress concentrations. Dr. Rice used a glass bar as an example of a strong material to elucidate his point: It is not easy to break a glass bar. By making a small notch into the glass bar, one can break the glass bar much easier, since after an initiation of fracture by the presence of the notch, the crack tip propagates rapidly.

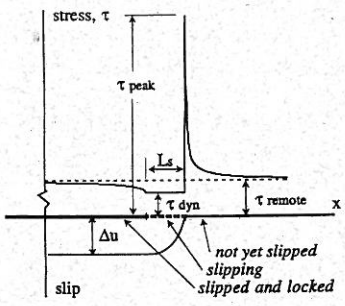
Similarly, the brittleness of earthquake faults means that the fault strength, although of order 100 MPa to initiate failure, degrades to negligible

fractions of the initial strength during a large and rapid slip. A likely cause is near-adiabatic shear heating of the fault zone, a process that is more effective if the fault zone is fluid-infiltrated. Dr. Rice discussed the seismic constraints, relating to the slip duration and earthquake size distribution, in support of the viewpoint of "strong, but brittle faults."



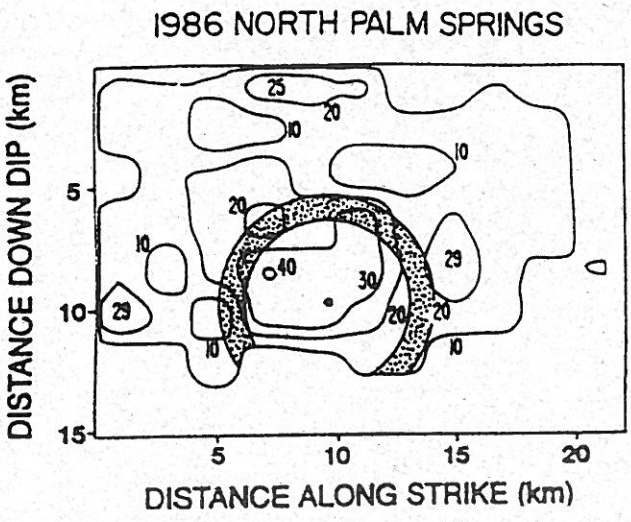
Earth brittle crust, with thickness about 15 km.

Brittleness alone can allow the fault to meet the heat flow constraint, but does not assure that the average stress borne by the seismogenic zone is low. To explain the low average stress in faults, it is critical to appeal to local stress concentrations. Simulations in the study of these ideas were done for fault models with standard lab-based rate and state friction, augmented by shear weakening in large rapid slips, with introduction of small fault patches at high pore pressure to provide the stress concentrations. (The small fault patches are readily driven to ruptures, and thus leading to stress concentrations on strong neighboring fault zone.) Dr. Rice's results showed that the average stress doing work on slip, and the average stress borne by the seismogenic zone, did effectively decrease towards acceptable levels, as he reduced the size of the constitutive length scales for slip-weakening, to within the computationally feasible range. Dr. Rice and his team employed massively parallel computers for the computational work.



Self-healing slip pulse: A slip region, followed by a slipped-and-locked region (self-healing), in Dr. Rice's model resembles the crystal dislocation model propounded by G.I. Taylor.

At end of the seminar, Dr. Drucker was invited to present to Dr. Rice a plaque commemorating the 22nd G.I. Taylor Memorial Lecture.



North Palm Springs 1986 earthquake: Contours of slip near the epicenter.

In addition to his achievements in fracture mechanics and plasticity, Dr. Rice also contributed to the advancements of finite element (FE) formulations in computational plasticity. In 1974, he co-authored with J. Nagtegaal and D. Parks a paper ("On numerically-accurate finite element solutions in the fully-plastic range") that has been widely referred to in many publications. Dr. Rice shared with us the following unprinted story behind this work. In the late 60's, he had an opportunity to work on ice-structure collision, with particular emphasis on the behavior of the ice. Using limit analysis and perfect plasticity, Dr. Rice derived the limit load for the ice sheet.

Numerical results obtained by the FE technology of the time exceeded the limit load by a substantial amount (and were thus not accurate).

Dr. Rice likened his feat with hand calculations to the exploits of John Henry, in a popular folk song (revived in the late 60's and early 70's), who beat early steel machines with his bare hands in breaking rocks in coal mines. Of course, the contribution of Dr. Rice and his co-workers in removing the mentioned deficiency in the then FE technology had been well noted, and opened doors to a host of other advanced FE formulations in computational plasticity. As mentioned earlier, Dr. Rice frequently turned to advanced computing technology as a recourse in his work: He used the Connection Machine CM5 to solve elastodynamic fracture problems to study earthquakes. In the end, John Henry (Dr. Rice) had enthusiastically adopted much improved steel machines (massively parallel computers) into the arsenal of the tools for his trade.

Knox Millsaps Memorial Lecture

In Fall 1997, the Knox Millsaps Memorial Lecture will be presented by **Dr. Jarek Sobieski** of NASA Langley. The title of his talk will be "Problems and Issues in Multidisciplinary Design Optimization" (MDO). The date of, and further information on, his talk will be provided on the AeMES web page.

Dr. Sobieski received his doctoral degree in technical sciences from the Technical University of Warsaw (TUW) in Poland. He then held a series of faculty positions, first at TUW (1955-1966), then at St. Louis University (1966-1971), George Washington University (1972-1991), and finally at University of Virginia (1991-present).

He has been on the staff of NASA Langley since 1971, holding several research and supervisory positions in structural and multidisciplinary analysis & design optimization. Currently, he is the Multidisciplinary Research Coordinator and Associate Manager of the Center of Computational AeroSciences.

He has received numerous honors that include the NASA Medal for Exceptional Engineering Achievement, and the AIAA MDO National Award in 1996. He is an AIAA Fellow and the Founding Chairman of the AIAA Technical Committee for Multidisciplinary Design Optimization.

Department News

Honors and Awards

Grad. Res. Prof. N. Cristescu gave a seminar on "Viscoplastic Constitutive Laws," on 25 Mar 97, at the Department of Mechanical Engineering, Florida State University, Tallahassee, FL.

Prof. R. Haftka was elected to the rank of Fellow in the American Institute of Aeronautics and Astronautics, the premier aerospace professional society with more than 30,000 members from all over the world. Dr. Haftka's area of expertise is in structural and multidisciplinary design optimization. He is the current president of the International Society of Structural and Multi-disciplinary Optimization.

Congratulations to **Ms. Shirley Robinson**, Senior Secretary, for receiving the University of Florida Superior Accomplishment Award, presented by Provost Capaldi on 26 Mar '97. This award program recognizes faculty, Administrative and Professional (A&P) employees, and University Support Personnel System (USPS) staff members who

contribute outstanding and meritorious service in their fields. The program also recognizes those employees who have made exceptional contributions to the University of Florida's efficiency and/or economy or to the quality of life it provides for students and employees. Shirley is our academic secretary, and is responsible for daily activities that include: student records, grades, drop/add, teaching schedules, etc. We are doing our best to keep her busy so that she can win another award.

Ms. Huasheng Zhu received a travel scholarship from the Benton Engineering Council to present a paper titled "Micromechanical Models for Failure Analysis of Fiber Composites," co-authored with Prof. B.V. Sankar, her MS thesis advisor, at a conference sponsored by the American Society for Composites Conference, Atlanta, Oct '96.

Teaching activities

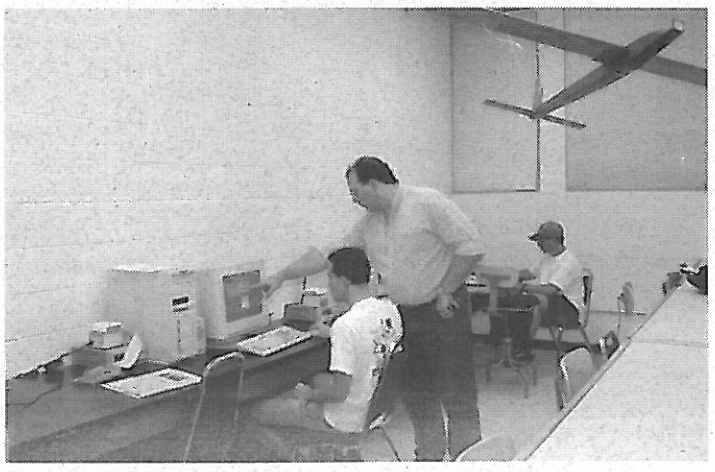
Biomechanics minor and biomedical degrees

In Fall '97, undergraduate students in Engineering Sciences will have the opportunity to graduate with a minor in Biomechanics. Also, beginning Fall '97, a new Biomedical Engineering Program will be granting M.S. and Ph.D. degrees in Biomedical Engineering. The program focuses on five main areas: Biomechanics, Biomaterials, Medical Imaging and Processing, Radiological Engineering, and molecular and Cellular Engineering. Partnering with engineering in the program are several clinical departments in the college of Medicine.

Experimental methods

Two new courses, Experimental Methods 1 and 2, have been recently created. This two-course sequence is taken during the senior year of both Aerospace Engineering and Engineering Science undergraduate students. Our goal for this course is to introduce students to modern experimental techniques using computer-based data acquisition and control. Each week students attend two one-hour lectures and a two-hour lab. In the lab session, teams of two will run a variety of experiments using experimental stations equipped with Pentium computers. The first offering of Experimental Methods 1, during the Spring 1997 term, is using temporary facilities in the Aerospace Engineering Building. Starting in the Fall of 1997, the course will be housed in a dedicated laboratory in the New Engineering Building (See cover story).

Students start off in Experimental Methods 1 by learning the popular LabVIEW graphical data acquisition programming language and studying the basics of using multipurpose input/output computer boards. The multidisciplinary experimental topics for the course include temperature, pressure, and strain gage measurement techniques as well as dynamics and controls experiments. The second course, Experimental Methods 2, gives more attention to statistical data analysis and experimental planning culminating with the students working in teams on a major experimental design project.

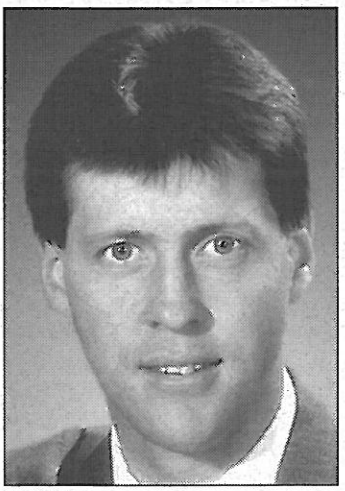


Assoc. Prof. B. Carroll working with a student at a Pentium computer in the lab.

Research activities

Faculty research highlight: Peter Ifju

Assist. Prof. P. Ifju has been with the AeMES Department since November 1993. He is currently the director of the University of Florida Experimental Stress Analysis Lab. With a staff of five students, this lab conducts original research in the fields of experimental stress analysis and composite materials. As an assistant professor with the department, Dr Ifju also teaches courses on experimental stress analysis, mechanics of materials, statics, and other classes on various advanced experimental techniques. This spring he was selected, by Tau Beta Pi Engineering Honor Society, as "*Teacher of the Year*," for the College of Engineering.



Dr. P. Ifju

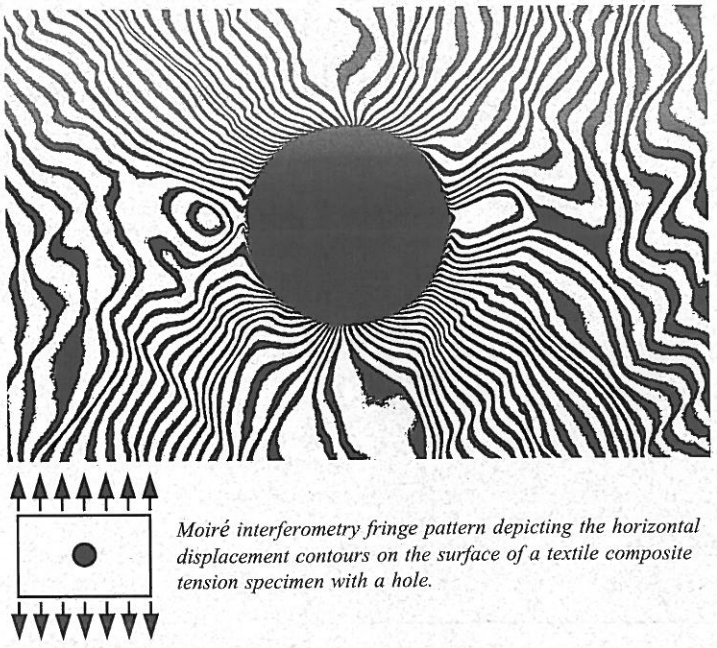
Dr. Ifju received a Ph.D degree in Materials Engineering Science, in June 1992, at Virginia Polytechnic Institute and State University (VPI & SU). His graduate degrees were performed under the guidance of Prof. D. Post, who was AeMES Emer. Prof. C. Taylor's first student at the University of Illinois. Prof. Post is widely recognized as a leader in the area of experimental stress analysis methods, including photoelasticity, electrical resistance strain gages and especially moiré interferometry (a laser based optical method used to measure strain).

While at VPI & SU, Dr. Ifju performed research in moiré interferometry, applications on composite materials, invented a strain gage for shear testing of composites and developed methods to extend the capabilities of moiré interferometry to high temperature testing. From his research at VPI & SU, he published numerous significant journal publications and received the Experimental Techniques (Society for Experimental Mechanics Magazine) outstanding paper of the year award. This was for the paper, co-authored with Dr. Yifan Guo, entitled "A Practical Moiré Interferometry System for Testing Machine Applications."

After receiving his Ph.D, Dr. Ifju continued his work as a postdoc at the NASA Langley Research Center in Hampton Virginia. There he worked in the Mechanics of Materials Branch under the Advanced Composites Technology (ACT) Program, studying textile composite materials. Advanced textile composites are a new class of materials that are composed of woven or braided high modulus fibers, such as carbon, incorporated into plastic matrix materials. These materials are candidates for the next generation of high performance aircraft such as the High Speed Civil Transport - an advanced civilian supersonic airliner. Since these material systems behave in a complex manner, sophisticated experimental methods were needed to understand their behavior. Dr. Ifju's work, using moiré interferometry to study the mechanical behavior of textile composites, guided the entire experimental part of the ACT program. A set of standard test methods were developed as a result of Dr. Ifju's research, and have been adopted at NASA Langley.

While at NASA, Dr. Ifju also co-authored, with Prof. Post and Dr. B. Han, a book entitled "High Sensitivity Moiré Interferometry for Mechanics and Materials." The book was published in January of 1994. Dr. Ifju teaches from the book as part of his experimental stress analysis class.

Since coming to Florida, Dr. Ifju received the National Science Foundation CAREER Award in June 1995. This award, a combination of the now defunct Research Initiation Award and Presidential Young Investigator Award, is given to a handful of young researchers in science and engineering. The judging criterion for the award included a research proposal, teaching proposal and research accomplishments. Dr. Ifju was awarded this grant based on his research proposal on absolute stress measurements in composite materials. To date, he and his research team of graduate students have made significant contributions to the study of residual stress in composite materials, by developing a novel test method using moiré interferometry. This method



Moiré interferometry fringe pattern depicting the horizontal displacement contours on the surface of a textile composite tension specimen with a hole.

allows for measurements that were not previously possible.

In addition to the CAREER Award, Dr. Ifju has received funding for a variety of research topics. The applications are quite diverse, but centered around the common need to perform mechanical characterization on challenging problems. He has worked on applications in composites, electronic packaging, stress sensitive coatings as well as paperboard shear testing. Funding sources include Ford, NSF, NASA, IBM, Rockwell, Spectrian Inc., and Sonoco. No matter what the application, he believes that his role as a problem solver is an important part of the end product.

Dr. Ifju is also active in student organizations and extramural activities including the windsurfing, and volleyball clubs, which he serves as the faculty advisor. Jokingly, he claims that he hasn't quite determined if he has ever advised members yet. The only faculty advice that he can remember giving was on the way to a volleyball tournament in Pensacola Florida when they crossed into the state of Georgia. They obviously missed a turn and his advice was to turn around and pick up where their navigation broke down. Dr. Ifju enjoys interacting with the students in a more relaxed setting such as club activities.

In Mar '97, the Experimental Stress Analysis Group hosted the Southeastern Symposium on Experimental Mechanics in the New Engineering Building (NEB; see article on Symposium on Experimental Mechanics and the cover story). There were more than 70 participants including 25 presentations.

In Apr '97, the Experimental Stress Analysis Research Group will be moving into a lab in the NEB. The new facility will be a state-of-the-art optics and mechanics laboratory. Dr. Ifju has purchased numerous major pieces of equipment that will be housed in his Laboratory. He is excited about the move and feels that it will be beneficial to his group's productivity. We can expect that Dr. Ifju and his research group will continue to make significant contributions to experimental mechanics technology in the future.

Bingo! Dr. Ifju got dumped into the water tank of a slam-dunk apparatus at a recent Engineering Fair.

Service to profession

Symposium on Experimental Mechanics

On 14-15 Mar '97, the *Southeastern Graduate Student Symposium on Experimental Mechanics*, organized by **Assist. Prof. P. Ifju, Emer. Prof. C. Taylor** and the Experimental Stress Analysis Group, was held in the New Engineering Building (NEB, see cover story), on the University of Florida campus. Participating schools included Auburn, Tuskegee, Clemson, Maryland, South Carolina, Johns Hopkins, Virginia Tech, New Mexico State, and of course the University of Florida. There were 25 student presentations and a total of over 70 attendees. This year marked the 25th anniversary of the event, whose roots started with a handfull of students, including the former students of Dr. Taylor at the University of Illinois in the late 70's. The purpose of the symposium was to give students the opportunity to present their research and meet students from other schools. The symposium was sponsored by the Society for Experimental Mechanics (SEM) and the AeMES Department. In addition to the student presentations on Friday and Saturday, there were laboratory tours of the NEB, a dinner and social in the Arredondo Room of the Reitz Union, on Friday night, and a lunch on Saturday. By all counts, the meeting was a complete success. In 1998, the event will be sponsored by the Mechanical Engineering Department at the University of South Carolina. In 1999, the event will be at Clemson University.

Participants in the Experimental Mechanics Symposium

Assoc. Prof. R. Tran-Son-Tay is co-organizing with Prof. J. C. Lelievre of France a session on Mass and Heat Transfer, Fluid Biorheology at the World Congress on Medical Physics and Biomedical Engineering in Nice, France, Sept. 14-19, 1997. The purposes of the congress are to report, promote and review the progress of our research for the benefit of patients and people with disabilities worldwide, to disseminate information and create awareness of priorities, to build friendship among the researchers and to promote peace and understanding through face-to face communication among the participants.

Assoc. Prof. L. Vu-Quoc was invited by NSF to participate in the organization of a joint Japan-US-Vietnam workshop on research and

education in Dynamics and Control. The workshop will be held in Vietnam in Summer 1998. The US delegation will be led by Prof. M. Tomizuka of UC Berkeley. The travel expenses of US participants will be funded by the Dynamics and Control Programs of the Electrical Engineering Division and the Mechanical and Structural Division of NSF.

Students activities

Congratulations to our graduate students, **Messrs. Hui Deng, G. Torres, and S. Venkataraman**, for being selected to receive the *Third International Student Academic Awards*. These students are recognized for their "individual achievements and for their contributions to this university by their presence and by their future achievements wherever they may carry out their professions." The award presentation ceremony was held at the International Students and Scholars Center on 10 Apr '97.

Congratulations

We warmly congratulate **Dr. R. Hirko**, Associate Engineer, and **Ms. Therese Lottinger**, our department Office Assistant, for their wedding, which took place on Sat, 8 Feb '97, at the Saint Elizabeth Greek Orthodox Church in Gainesville. With an expertise in electronics and instrumentation, and a member of our team of biomechanics faculty, Dr. Hirko has been actively involved in rehabilitation research. The couple's future plan is to live in Gainesville happily ever after.

Other activities

Gearing up for the Micro Aerial Vehicle (mAV) Competition *held at UF on 5 Apr '97:* ***Dr. D. Jenkins*** *working with a student on an AeMES mAV model, in the department machine shop, on a Saturday before the competition. We will cover this competition in our Fall '97 issue.*

Faculty Search

We are seeking nominations and applications for two tenure accruing positions in the areas of biomechanics, experimental dynamics and controls including MEMS, aerodynamics/flight mechanics, and mechanics of materials. The preferable appointments will be at the **assistant** or **associate professor** level for individuals with a proven record of innovative research, publications, and work related experience. The search will be closed on July 31, 1997 and the appointments are to be effective January 1998 or later. We are seeking the help of alumni and friends in identifying potential candidates. Please send your nomination or, in case you are a candidate, your application to: Dr. U. H. Kurzweg, AeMES Search Committee, P.O. Box 116250, University of Florida, Gainesville, Fl 32611-6250.

Prof. M. Shuster will spend the Summer '97 as a visiting professor at the University of Toronto's Institute of Aerospace Sciences.

Seminars on Videotapes

Last Fall, the department started to videotape select distinguished lectures to establish a tape library. Future G.I. Taylor and Knox Millsaps Memorial Lectures will be added to the library. Thus far, we have taped the seminars of **Dr. Sheila E. Widnall** (Secretary of the Airforce, Fall '96), **Dr. William F. Powers** (Vice President for Research at the Ford Motor Company, Fall '96), and **Dr. James R. Rice** (Gordon McKay Professor of Engineering, Harvard University, Spring '97).

Visiting Professors

Assoc. Prof. Mehmet A. Akgün, Aeronautical Engineering, Middle East Technical University, Ankara, Turkey, is visiting AeMES for six months to work with Prof. R. Haftka. Dr. Akgün's past works include dynamic response of damped systems, computation of eigensolution of modified systems without complete reanalysis, buckling and post-buckling of composite columns, adhesive and pin joints in composites and aeroelastic divergence behavior of composite wing structures. He is currently working on structural optimization and solution of ill-conditioned systems. Dr. Akgün gave a seminar titled "Static aeroelastic tailoring of composite wing boxes."

Prof. Michel Aubertin from the Ecole Polytechnique, University of Montreal, Quebec, Canada, is visiting AeMES from Jan '97 to Apr '97 to work with Prof. N. Cristescu and Dr. Oana Cazacu. Dr. Aubertin's areas of research are in rock mechanics and ground water hydrology. In rock mechanics, he has developed viscoplasticity models with damage for rocks. At the Ecole Polytechnique, he is the Head of the Mining Engineering Section, Civil Engineering dept, since 1994. He also teaches at McGill University. Dr. Aubertin gave a seminar in the AeMES department titled "Viscoplastic models for alkali halides in the semi-brittle regime."

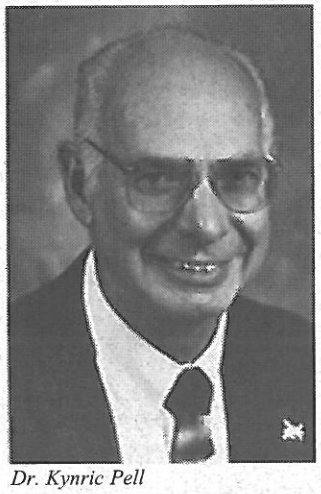
We welcome **Dr. John H. Garcelon**, who joined our department as a Visiting Assistant Professor. John's primary area of research is in automated design systems and computational mechanics including structural optimization, neural network applications, and finite elements. He has worked extensively in visualizing engineering systems by developing pre- and post- processing software for design applications. John is currently working with Dr. Rafi Haftka on developing approximation methods for optimization and damage tolerant design.

Dr. Udo Hunsche, Chief of Department at the Federal Institute for Geosciences and Natural Resources, Hannover, Germany, spent a brief visit in the AeMES department, in Apr '97, to continue his long time collaboration with Prof. N. Cristescu on rock mechanics. Dr. Hunsche is a known experimentalist in rock salt mechanics. He is working with Dr. Cristescu on a book titled "Time Effects in Rock Mechanics," and on a constitutive law used in the design of radioactive waste repositories.

Also welcomed to our department is **Dr. H.S. Udaykumar**, Visiting Assistant Professor. Uday's work so far has mainly been in the area of moving boundary problems in fluid dynamics. He has developed numerical algorithms to handle multimaterial flows. This work includes solid-liquid interfaces to simulate phase change and fluid-fluid boundaries which arise in a multitude of problems ranging from droplet and bubble dynamics to the flow of cells in the human microcirculation. He has also been involved in simulation of combustion of solid-fuels in turbulent crossflows. Uday is collaborating with Drs. Wei Shyy and Roger Tran-Son-Tay. His current work is heading toward improving the methods developed so far for the simulation of multiphase dynamics in arbitrary geometries on Cartesian grids, with particular attention to the efficiency and flexibility of the algorithms.

Alumni Profile

Congratulations to **Dean Kynric M. Pell**, who recently accepted to lead the College of Engineering of the University of Wyoming.



Dr. Kynric Pell

Dr. Pell attended UF from 1959 to 1967, obtaining bachelor's, master's and Ph.D. degrees in Aerospace Engineering under the guidance of then Department Head **Dr. Mark Clarkson**. He then completed a year of post-doctoral work with **Dr. David Williams**, a faculty member at UF at the time, before going to Auburn University as an Assistant Professor of Aerospace Engineering for a few years. He moved to the

University of Wyoming in 1971 where he progressed through the academic ranks, becoming Department Head of Mechanical Engineering in 1989. He held this post until 1996 when he became Dean of the College of Engineering.

The education and research training that he received at the AeMES department under the guidance of then Department Head and major professor **Dr. Mark Clarkson** served as the basis for his studies of heat and mass transfer as they affect our nation's highway infrastructure. His work in this area led to a national recognition with a Transportation Research Board Award. With the cooperation of **Dr. John E. Nydahl** (also a UF alumnus), together with the help of more than twenty graduate students, Dr. Pell developed, patented, and fielded a number of heat pipe-based devices used to ameliorate the effects of snow and ice.

The concepts of shared governance and graduate student involvement in establishing the policies and the administration of a university which were made an integral part of Dr. Pell's experience at UF have served as a personal model throughout his career.

He has many fond recollections of working late at night or through the night at the department's field building off Archer Road. The building was a hub of activity with all the graduate students and many of the faculty working late into the night, often capping the evening with an experimental study of "bubble dynamics" in malt beverages.

Following one of these evenings, Dr. Pell returned to the laboratory to discover that someone had reset the controls on an RF generator he was using to create an induction-coupled plasma. It was only in the last few years on a visit to the UF Eglin campus that **Dr. Ed Milton** told him that he had flipped a knob on the generator controls when he left the lab that night. Ed Milton said that Kynric was so upset the next morning that he was reluctant to tell him.

Dr. Pell also remembers sitting in on **Dr. Norman Soong**'s seminar where Dr. Soong was criticized for the relatively few experiments he had completed on the study of shock waves associated with an arc discharge. Dr. Soong told the group that it was very difficult to obtain this data. It was only after considerable prompting that they learned that Norman Soong was getting a terrible shock each time he opened a valve to initiate an arc.

Kynric Pell has fond recollections of family outings and parties shared with other students and faculty. He and the late **Dr. Knox Millsaps**, former AeMES Chair, shared an interest in music, especially jazz. At his home, Knox Millsaps would talk about playing the drums with the jazz greats when he was a teenager, while helping Kynric Pell develop an appreciation for a variety of liqueurs. At Kynric Pell's trailer, they would listen to Stan Getz and Paul Desmond play "Time Out"and "Take Five" and Knox Millsaps would make do with the beer grad students could afford.

Dr. Pell and his wife, Ann, often reflect on their experiences in Gainesville. The synergy of world events, competition among the graduate students and exposure to the variety of research that was underway made that time one of intense professional and personal growth. Ann Pell remembers this time in terms of the births of their first two children and a period of relative poverty shared by most of their friends.

One morning, Dr. Pell arrived at the lab and was greeted by a very irate Argentine machinist, **Hector Milan**. In Dr. Pell's words, Hector was one of the best machinists he has ever known and his lab was just a little cleaner than most people's kitchens. It turned out that during the night Norman Soong had attempted to rewire a pole lamp, and in the process had struck several arcs on the surface of the band saw and managed to weld the fence to the table. The next day Hector had meticulously restored the lamp, but with a very heavy duty cable and plug. It sat in the middle of the shop surrounded by fire extinguishers, fireman's garb and various signs written in Chinese. He and John Nydahl have enjoyed telling many of these stories to two generations of students.

John Nydahl and Kynric Pell share the view that the graduate educational experience they received at the University of Florida is one they seek to emulate at the University of Wyoming. It has been inculcated into their graduate students over the past twenty-five years, and is now being shared by their students on campuses throughout the world.

Alumni News

Jiamin Bai, Ph.D. '94, received the "Golden Award of Excellence" of the Ford Motor Co.'s yearly Custom Driven Quality Awards. The award recognized his work on implementing the dynamic durability analysis process for composite heavy truck body structures. Dynamic stress analyses of a vehicle model were conducted for real road loading conditions. The corroboration of analytical results with test results validated the vehicle model.

Ming Li, Ph.D. '93, received in Dec '96 an award for his work titled "Fracture limit diagrams for aluminum alloys," co-authored with D.J. Lege and O. Richmond, as "The Best Technical Report of Alcoa of the Year." Fracture Limits are critical concerns in product and process design, alloy design and selection, and alloy performance evaluation.

Examples include splitting in sheet press forming, sliver generation in trimming, burr formation in blanking matrix of computer discs, crashworthiness of extrusion as well as die casting automotive components, etc., to name just a few. Only one technical report is selected for this award from several hundred technical reports issued by Alcoa every year.

Editor's note: *All news items and articles that did not appear in the present issue of the newsletter will appear in future issues. We thank you for your support and understanding. Please continue to send in your news.*

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