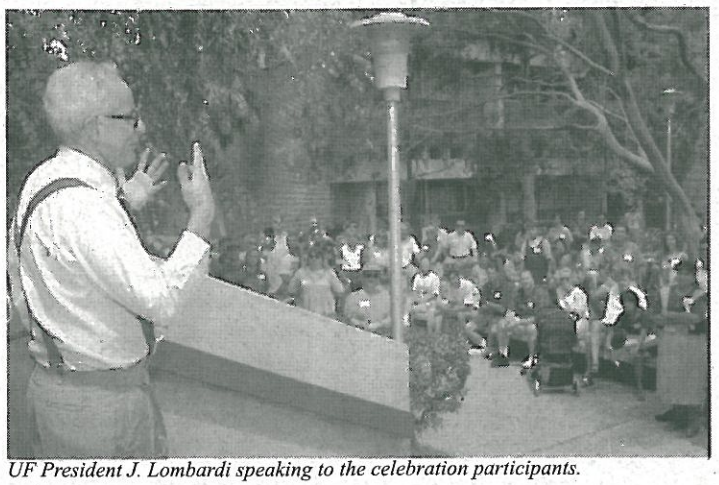
NEWSLETTER FOR ALUMNI, FRIENDS & STUDENTS

FALL 1996

THE STREAMLINE

AEROSPACE ENGINEERING, MECHANICS & ENGINEERING SCIENCE

AeMES Golden Anniversary Celebration



UF President J. Lombardi speaking to the celebration participants.

A Golden Anniversary Celebration that marked 50 years of dedicated service of the AeMES department to the training of several generations of engineers for the State of Florida and for the Nation was successfully organized on 6-7 Sep 1996, with the participation of some 300 persons, made up of returning alumni, students and their family members, and faculty.

On Friday, 6 Sep 1996, a luncheon was given in the department conference room for returning alumni and faculty members from AeMES and from other departments. Mingling with recently hired faculty members at this cordial luncheon were alumni who graduated as far back as shortly after the founding of the AeMES department, such as Mr. William Roberts of the class of 1950. We were particularly happy to have the participation of Prof. John Anderson, Jr. of the University of Maryland, an alumnus of the class of 1959, who was invited to deliver the first *Distinguished-Alumni Lecture*. We were excited to learn about the career paths of returning alumni since they left UF.

In the afternoon of Friday, the height of the celebration was the lecture of Dr. Anderson entitled "The race for first flight: Langley and the Wright Brothers" (see the column on the Distinguished-Alumni Lecture). He delivered an excellent lecture that captured the enthusiasm of the audience constituted of other returning alumni, students, and faculty from AeMES and other departments. During the reception that followed his seminar, Dr. Anderson was surrounded by students and faculty excited by his excellent lecture, and constantly bombarded with questions that he had little time for relaxation and refreshment.

In the evening, Mr. Jim Woodall, BSAE '62, gave a lecture on "Aerospace today: A personal perspective." Mr. Woodall retraced his career path from his four years with the Air Force to his thirty years with Rockwell International. Currently, Mr. Woodall is a Member of the Technical Staff in the Space Systems Division of Rockwell International, based in Houston, Texas. Mr. Woodall's experience includes his participation as a structural systems engineer in the development of the Saturn rocket that was a key component in the Apollo program in the 60's, and in the development of Skylab in the early 70's. Mr. Woodall offered valuable advice related to job-and-family aspects to students in the audience. We thank Mr. Woodall who, answering a request to alumni in our newsletter, volunteered to give the above lecture. Joining Mr. Woodall in the celebration were his wife and two of his children.

AeMES Alumni and family (on the right is Mr. Roberts, BS '50)

Table of Contents

Department Chair: Wei Shyy

Editor:
Loc Vu-Quoc, Tel: (352) 392-6227,
E-mail: vql@cauchy.aero.ufl.edu
Associate Editors:
Richard Fearn
Roger Tran-Son-Tay
Peter Ifju
Design and layout:
Jan Machnik

AeMES Web page URL:
http://www.aero.ufl.edu/

G.I. Taylor Memorial Lecture on 7 Mar '97 by Prof. J. Rice, Harvard University (see page 5)

UNIVERSITY OF FLORIDA

On Saturday, 7 Sep '96, the celebration participating crowd was treated with a barbecue lunch sponsored by the Pratt & Whitney Company, whose representative was Mr. Carl Meece, an alumnus of the class of 1969 and Director of the Pratt & Whitney's Turbine Technology Center. The barbecue was given in the courtyard in front of the department building. Following the photo opportunities with the Gator Mascots Albert and Alberta and a tour of the laboratories in the department, President J. Lombardi, Provost B. Capaldi, and Mr. C. Meece addressed their remarks to the crowd in the courtyard. The mood was heightened when Dr. Lombardi remarked that the College of Engineering (COE) is the best college in the university.

Students in engineering societies displayed posters with photos related to the activities of their respective societies. Memorabilia consisting of T-shirts, coffee mugs, etc. bearing the logo of UF and of the specially-designed logo for the Golden Anniversary Celebration were available to everyone. It was a nice opportunity for the younger generations to meet with their predecessors in a warm family atmosphere. We met and chatted with several alumni who graduated in 1948 and 1949. Among the crowd were also key faculty members from some other departments to observe the organization of our celebration to prepare for the coming celebrations of their own departments.

At 5pm on that Saturday, many celebration participants went together to the Ben Hill Griffin Stadium to watch the football game between the UF Gators and Georgia Southern's Eagles. COE Dean Win Philips, who just barely returned from his trip to Washington, D.C., stopped by to say hello to the alumni watching the football game. (Of course, the Gators won by a large margin.)

The celebration did not, however, end there, but continued on with the return to UF of two more AeMES alumni, Dr. William Powers and Dr. Knox Millsaps, Jr., who delivered their lectures in our department (see *Highlights of Department Seminars*).

Overall, the Golden Anniversary Celebration was a success, collectively made possible by everyone in the large AeMES family that includes alumni, students, and faculty, aided by the perfect weather. We especially thank Mr. Keith Barber of the COE Office of Alumni and Development for making this occasion a success. To those alumni who could not join in the celebration, we hope to see you in similar events in the future; for the time being, it is hoped that this newsletter and the photos herein would help to convey to you the cheerful and exciting mood at the celebration.

***Front:** Alumna and Provost Capaldi. **Back:** Mr. Meece, UF Pres. Lombardi, Prof. Shyy.*

Highlights of Department Seminars

First Distinguished Alumni Lecture

On Friday, 6 Sep '96, coincident with the Golden (50 years) Anniversary celebration of the founding of the AeMES department, **Dr. John Anderson, Jr.**, an AeMES alumnus and a professor of Aerospace Engineering at the University of Maryland, College Park, Maryland, delivered the department's first *Distinguished-Alumni Lecture*, titled "The race for first flight: Langley and the Wright brothers."

Dr. Anderson has a long and distinguished academic career since his graduation from the AeMES department in 1959, with a B.S. in Aeronautical Engineering. His father, an Economics professor at UF, brought him to Gainesville at the age of eleven. Dr. Anderson is also an alumnus of Gainesville High. After receiving his Ph.D. in Aeronautical and Astronautical Engineering from Ohio State University in 1966, Dr. Anderson spent eight years

John Anderson, Jr.

(1966-73) with the Naval Ordnance Laboratory (NOL) in White Oak, Maryland. In 1973, he left his position as Chief of the Hypersonic Group at NOL to join the University of Maryland (UMD) at College Park as the Chairman of the Aerospace Engineering department for another eight years from 1973-80. Since 1980, Dr. Anderson has been a Distinguished Teacher/Scholar at UMD, where he is also on the Committee for the History and Philosophy of Science. Dr. Anderson regularly advises the Smithsonian National Air & Space Museum in Washington, D.C., for its exhibits as Special Assistant for Aerodynamics. A prolific writer, Dr. Anderson is the author of six books, with more coming for publication.

As an authority in the history of flight, Dr. Anderson fittingly gave a lecture on the early development of flying machines pointing to various less known facts in an auditorium fully packed with returning alumni, students and faculty from the AeMES department, and from other departments.

The modern history of airplanes can be divided into three eras: The bi-plane era, 1903-20 (which was opened with the first flight by the Wright Brothers), the era of mature propeller-driven airplanes from 1920 to 1945 (WW II airplanes), and the jet airplane era (modern airplanes). The concept of airplanes as heavier-than-air flying machines that have a fuselage, fixed wings, and tail dated, however, far back in history, well before the Wright Brothers.

Using dual slide projectors, Dr. Anderson chronicled important historical milestones in the development of flying machines, starting with the flying machine having flapping wings (imitating birds) for both lift and propulsion conceived in drawings by Leonardo da Vinci in 1492, to subsequent conceptions that ultimately led to the concept of modern airplanes (with fuselage, fixed wings, tail, and propulsion engines). Even though without any redeeming aerodynamic value, the excellent idea of Leonardo marked the beginning of a long path of mankind toward the realization of a much older dream of flying (e.g., as recorded in the Greek mythology of Icarus falling back down to the Aegean sea, with his wings made of wax melted by heat as he flew toward the Sun). However, the idea of flying in a machine became popular only in the late 18th century with the invention of the hot-air balloon by the Montgolfières in Paris; their balloon could sustain a 20-minute flight at the first public demonstration.

A revolution came in 1799, when George Cayley of England conceived a flying machine that had almost all components of a modern airplane (fuselage, fixed wings, tail), but still propelled by a flapping mechanism. It thus took more than 300 years to achieve a significant progress toward a modern airplane, since Leonardo da Vinci. Cayley built the first wooden glider in 1804 to demonstrate the concepts of fuselage, fixed wings and tail. Cayley was the first to separate the ideas of lift and propulsion. He was also the inventor of the tractor mechanism still used nowadays in heavy equipment and in tanks. An aristocrat, Cayley (a Baron) was also involved in politics, as a member of the British Parliament.

In 1874, Felix du Temple, a French naval captain, introduced the swept-forward wings concept, but his prototype powered flying machine only hopped off the ground then came back down. du Temple's machine marked the first "power hop" of a machine designed to fly.

In 1890, Otto Lilienthal, a Berlin engineer, introduced the first book on aerodynamics, in which he was the first to use the lift and drag coefficients. While both Cayley and du Temple were self-taught inventors, Lilienthal was a trained engineer and the first person with a science degree to contribute to the history of flights. Lilienthal invented the hang-glider, and unlike his predecessors, wanted to learn how to fly before putting propulsion engines

on flying machines. Unfortunately, he died in 1896, a day after a wind gust toppled his glider. Should Lilienthal live, he would perhaps have beaten the Wright Brothers for first flight.

Up till then, there were no Americans working on flying machines, not a popular subject. The Americans had been focusing on expanding their frontiers Westward. In the late 19th century, events took a different turn because of a single, self-assured, self-confident man named Samuel Langley, who did not receive formal college training by choice. A bright man, Langley was interested in architecture and later in astronomy. He became an authority on Sun spots. He was hired to teach math and astronomy at the Naval Academy. In 1886, his attendance in a session on the making of flying machines at a meeting of the American Society for the Advancement of Sciences arouse in Langley a deep interest in this subject. He subsequently convinced his laboratory to build a whirling arm for aerodynamic measurements. By the turn of the century, whirling arms went out of favor as an aerodynamic experimental tool; they were replaced by wind tunnels. In 1887, Langley was appointed to the most prestigious scientific position at the time: Secretary of the Smithsonian.

In 1896—a century ago—Langley achieved a one-minute sustained flight of a small scale (14 ft wingspan) heavier-than-air, powered flying machine, catapulted from the top of a houseboat on the Potomac river in Washington, D.C. Langley chose to launch his craft from a houseboat to avoid obstacles and for soft landing on water. According to Dr. Anderson, Langley was not given enough credit for this work. Interestingly, Dr. Anderson pointed out that the photo of this historic event was taken by Alexander Graham Bell, the founder of AT&T and a close friend of Langley. An important year for aeronautics, 1896 was also the year that Lilienthal died in Europe.

From 1896 on, the Wright Brothers, then residing on Hawthorn Street in Dayton, Ohio became interested in flying machines. They read everything about the subject, and followed closely the progress of Langley. The interest in mechanical machines in the Wright Brothers, who did not receive high-school diplomas (due to their move to Dayton, Ohio, even though they did complete high school), was instigated by their mother. They were successful business men, first in the printing press business, and then later in the bicycle business (a serious business at the time). Their venture into the building of flying machines was actually financed by their income from the bicycle business. They were excellent self-taught engineers.

In 1901, after two years of disappointing flights of their gliders (at Kitty Hawk, North Carolina), which produced only one-third of the lift they calculated based on Lilienthal's aerodynamic data, the Wright Brothers courageously threw out all of the previous experimental data, and built a wind tunnel to test more than 700 different airfoils. They discovered the influence of high aspect ratio in the wings, although this effect had been measured earlier by Langley. In 1902, they successfully flew a new glider, having a larger aspect ratio (six) than in their old glider. With the glider working, they were ready to build a new powered machine. Failing to find a company that could build an engine according to their specifications (12 HP and 120 lbs weight), the Wright Brothers again did everything themselves, with Orville in charge of the engine, and Wilbur the propellers. They were the first to realize that a propeller is nothing but a twisted wing. Their work on propellers was carefully recorded in their notebooks. Unfortunately, the Wright Brothers's work on propellers was not well recognized. By Summer 1903, they had an airplane with propellers driven by a gasoline engine ready to be tested.

In parallel, in D.C., Langley received $50,000 (of course a large sum at the time) from the US government to build a flying machine to support the Spanish-American War. Langley also received another $23,000 from the Smithsonian for his work. In 1903, Langley was working furiously on a powered flying machine. The first test flight launched from a houseboat in Oct 1903, covered by the Washington Post, was a failure. Another test flight on 8 Dec 1903 ended with a structural failure (the rear wings snapped). In retrospect, Langley's flying machine had good aerodynamics and a good engine, but was weak in structure. Langley's failures resulted in an uproar in Congress, with politicians wanting to cut his research budget (a situation not unfamiliar with present-day atmosphere!). Washington's politics and caustic critics in newspapers in the end destroyed the once supremely confident Langley, who died a broken man in 1906. (Actually, Langley's flying machine did finally fly successfully in 1914 after Glen Curtiss made some 93 technical modifications to the original design.)

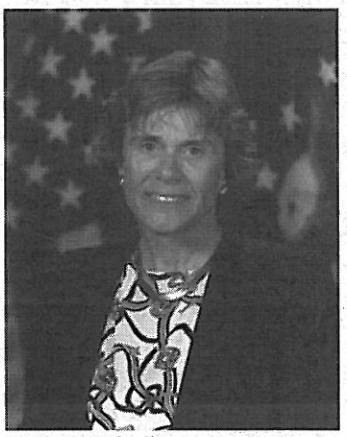
Barely nine days after the failed test flight of Langley, on 17 Dec 1903, at 10:35am, with Orville on the airplane, the Wright Brothers achieved human's first sustained, powered, human-carrying flight. They went on to build bigger and better airplanes with the first practical machine in 1905. In 1906, a patent was granted to the Wright Brothers. In 1908, both the US and France agreed to buy airplanes from the Wright Brothers. The success of the Wright Brothers since then is well documented. The death of Wilbur in 1912 by typhoid fever marked the end of an innovative era in aeronautics for the Wright Brothers, with Orville becoming more of a guru on aeronautical technology. Orville died in 1948, after having agreed on the repatriation of their first flying machine from Britain, where it had been on display at the British Science Museum in London from 1928 to 1948. (Orville had refused to give the Wright Flyer to the Smithsonian earlier because of disagreements stemming from 1914.)

The audience was captivated by the exciting, parallel chronicle of the race to first flight between Langley and the Wright Brothers. Dr. Anderson attributed the success of the Wright Brothers (who remained unmarried throughout their lives) to their ingenuities, dedicated hard work, and perhaps most importantly to their courage in challenging previous experimental data and their decision to redo the experiments themselves.

Dr. Anderson's lecture was highly acclaimed by the audience. Relevant to the above lecture is his book titled *Introduction to Flight*, now being updated for the 4th edition. Joining Dr. Anderson at this celebration occasion was his wife, who also grew up in Gainesville with a family rooted in this area for some generations.

Dr. Anderson told us that he often collects coffee mugs bearing the logos of the universities that he visited. The Andersons enjoyed the memorabilia that they collected from their homecoming (specially designed T-shirts and coffee mugs, bearing the UF logo and a logo commemorating the AeMES Golden Anniversary).

First Knox Millsaps Memorial Lecture



Sheila E. Widnall

On 24 Sep '96, **Dr. Sheila E. Widnall**, Secretary of the Air Force, gave the first annual Knox Millsaps Memorial Lecture in the AeMES Department. The memorial lecture series commemorates the late Knox Millsaps, former faculty and chair of our department. We are truly honored to have such distinguished and accomplished speaker to set the tone for the seminar series.

Dr. Widnall was selected to the top position in the Air Force after a 28 year career in academia as a faculty member at MIT, where she held the positions of Assistant, Associate, Full Professor, serving as faculty, Chairperson, and Associate Provost of the University. She also served as the Division Head of Fluid Mechanics, directed the Fluid Dynamics Research Laboratory and chaired MIT's Committee on Academic Responsibility. She has won numerous honors including, The Lawrence Sperry Award given by the American Institute of Aeronautics and Astronautics, The Outstanding Achievement Award given by the Society of Women Engineers, The Washburn Award given by the Boston Museum of Science, and the Maxwell A. Kriendler Memorial Award, given by The Air Force Association.

Dr. Widnall gave an inspirational seminar entitled "Partnership and Progress: Science, Academia and the Public Domain" on the perspectives of how science and technology have influence public policy. She initiated her presentation by reflecting back to her childhood in Tacoma Washington, where she documented her early

fascination with flight while growing up in the flight path of a military base. She spent summers working at Boeing and eventually went to college at MIT.

She drew parallels on how universities and the Air Force were similar in that they both are value and educationally centered. Her previous roles in an advisory capacity for the Air Force, disciplinary committees at MIT, and above all as an engineer, served to enhance her qualifications as Secretary of the Air Force. Dr. Widnall claimed that the Air Force rivaled any Fortune Five Hundred company in education and professional development. She emphasized that public policy makers must know enough about technology to make critical decisions, to get the facts right first, then make the decisions.

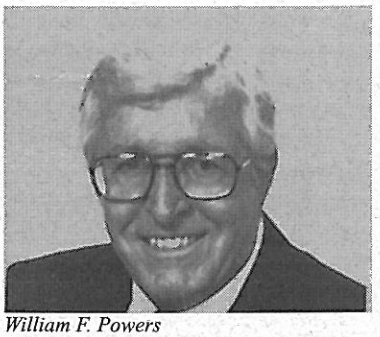
Dr. Widnall outlined how engineers have played a key role in establishing the dominance of America's military forces. She indicated how science and technology have played three key roles. First, science and technology has become the backbone of our military. Second, advancements in Air Force sponsored activities has lead to the development of new products. Finally, science and technology has solved problems that may have otherwise ultimately led to war.

The future Air Force has many challenges ahead, but technology will provide the guiding rail. The modern military is becoming more streamlined and faces the option of privatization. There will be many opportunities for engineers in our military, and today's aerospace and engineering mechanics students will lead the Air Force into the next era.

After the seminar, Dr. Knox Millsaps, Jr.—the son of the late Prof. Millsaps and currently Assist. Prof. at the Naval Postgraduate School in Monterrey, CA—presented Dr. Widnall with a plaque commemorating her participation in the first annual Knox Millsaps Lecture.

Visit the AeMES web site for the full text of Dr. Widnall's speech.

Benton Lecture by AeMES Alumnus



William F. Powers

On Friday, 27 Sep '96, as part of the Department's 50 year anniversary week festivity, **Dr. William F. Powers**, Vice President for Research at Ford Motor Company, came back to UF to give two seminars.

Dr. Powers received his B.S. in Aerospace Engineering in 1963 from the University of Florida, and his Ph.D. in Engineering Mechanics in 1968 from the University of Texas at Austin. He was involved with the development of the Saturn Booster guidance system and Apollo mission analyses at NASA Marshall Space Flight Center from 1960-1965. He consulted on the Space Shuttle Program with the NASA Johnson Space Center during the period 1970-1979. From 1968-1980, he was a Professor of Aerospace Engineering and Computer, Information and Control Engineering at the University of Michigan. Dr. Powers holds many distinguished awards and honors. To name a few, he is a member of the National Academy of Engineering, a Fellow of the Institute of Electrical and Electronics Engineers, a foreign member of the Royal Swedish Academy of Engineering Sciences, a member of the ITS America Board of Directors, and a member of advisory committee for the universities of Illinois, Michigan, Texas, and Purdue.

In the morning, Dr. Powers gave a short presentation to the faculty on the environmental issues that are driving the whole automotive industry. These issues are:

- Emission: smog, CO_2, CFC depleting ozone;
- Recycling: making cars that can be recycled;
- Fuel economy and Partnership for New Generation of Vehicles (PNGV): making more efficient cars.

In the afternoon, Dr. Powers delivered the Benton Series Lecture on "Automotive Information Integrated Engineering." We learned that some of the challenges and reasons facing the automotive industry in year 2000 are:

- Global economy: demand from China, India, etc. for low cost and advanced cars;
- Time driven: able to change quickly, compress design cycle time;
- Lean enterprise: low inventory, high quality and low cost;
- and People: computers are having an impact on how we do work, and many non-value-added jobs will be eliminated in the future. The resulting work force will become much more empowered.

Dr. Powers showed us how integrated computer and communication technology applies to the total automotive business and follows the typical automotive business timeline: (i) Research & Styling; (ii) Product Development; (iii) Manufacturing, (iv) Marketing & Sales; and (v) After-Sale Service. The focus of his talk was on the use of the computer in the design process of automobiles. The analogy between the typical automotive business timeline and his example is: (i) A global design studio. People from all around the world share ideas and work together in real time through video-teleconferencing. (ii)-(iii) C3P. This is the acronym for Computer Aided Design-Computer Aided Manufacturing-Computer Aided Engineering-Product Information Management. Its role is to integrate product development and manufacturing. The benefit of this new technology is that engineers can now review the assembled cars on computers, instead of on shop floors. They have the ability to zoom in on the computer to view data in greater detail or simulate several options. These capabilities save time and reduce certain work from 2-6 months to less than 1 month. Of course, this technology requires that engineers must have a system approach to design. They used to be component oriented (i.e., each engineer is specialized in the design of a specific component). (iv)-(v) World Wide Web and Fordstar. Ford has two internet systems; one that can be accessed through http//www.ford.com, and one that is limited to people from Ford. Technical assistance, advertisement, information, etc., are provided through these systems. (Ford has over 300 internal servers.) Fordstar is a satellite system that uses 8 channel TV for training, servicing, distance learning, tracking car service, etc. Dr. Powers stressed that integrated computer and communication technology is the future. The vision for the global infrastructure is the five "ANYs": ANY information, in ANY format, for ANYone, in ANY location, at ANY time.

At the end of the seminar, Dr. Jack Benton presented to Dr. Powers the Benton Series Lecture Award.

Knox Millsaps Fund

News update

During the fiscal year ending June 30 1996, thirty alumni and faculty donated to the Knox Millsaps Memorial Endowment Fund. A summary of the financial status of the Fund for the past three years is given below.

Year	New Gifts	Net Investment Earnings	Awards Budget	Year-end Balance
1994	11,403	356	2,366	56,826
1995	15,371	10,076	3,168	79,105
1996	9,245	12,647	3,726	97,271

The Fund provides long-term support for awards for undergraduate and graduate students (see students activities), and honoraria for two named lecture series. For more information about the Fund, its goals and specific activities, contact Richard Fearn. Your support for these activities is appreciated. In addition to contributions sent directly to the Department, you may specify the Millsaps Fund by name when responding to mailings or phone solicitations from the Florida Foundation.

Book donation

We would like to extend our heartfelt thanks to **Dr. Joe F. Reeder**—a colleague and close friend of the late Prof. Knox Millsaps, a former AeMES Chairman—for the donation of his more than 500 books, collected throughout his long teaching and research career. Many of these books are classics (e.g., the calculus of variations by Bolza, Gelfand and Fomin, etc.) His books, accessible

to all AeMES students and faculty alike, are now on display in the department's conference room.

Dr. Reeder had a long teaching and research career dated since 1940, with an interruption due to World War II. He received his Ph.D. in math from MIT in 1949. After two years of teaching at the Iowa State College (1949-51), Dr. Reeder, who was a reserve pilot, joined the Wright-Patterson Air Force Base (WPAFB), in Dayton, Ohio, to work on logistic command and military training.

Dr. Reeder met Dr. Millsaps while working in the Aeronautical Research Laboratory (ARL) at the WPAFB, in Summer 1952. In 1956, after having become Chief Scientist at the Air Force Missile Development Center (AFMDC) in Holloman, New Mexico, Dr. Millsaps invited Dr. Reeder to come to AFMDC as a consultant on flight mechanics (flight paths optimization using the calculus of variations). After spending three summers at AFMDC, Dr. Reeder, at that time an Associate Professor at Purdue University, was persuaded by Dr. Millsaps to leave Purdue to become the Director of the Holloman Graduate Center (similar to the Eglin Graduate Center at the Eglin Air Force Base in Florida nowadays). There, Dr. Reeder held a joint appointment as professor at the University of New Mexico. At Holloman, Dr. Reeder worked closely with Dr. Millsaps until 1962, when Dr. Millsaps left to become the first civilian Executive Director of the Air Force Office of Scientific Research (AFOSR) in Washington, D.C., a position previously held by only military personnel at the rank of Brigadier General.

Dr. Reeder stayed at Holloman until 1966, when he joined the University of Missouri at Rolla, Missouri, and remained there for four years, until 1970. Then from 1970 to 1990, he taught for 20 years at the University of New Orleans, Louisiana, and retired from his teaching duty in 1990. In 1980, Dr. Millsaps, then the Chairman of the AeMES department, invited Dr. Reeder to spend two quarters of sabbatical leave at the University of Florida, with funding support coming from Pratt & Whitney.

Even though his books span several fields, a particular subject that interested Dr. Reeder most was the calculus of variations (which he applied to flight mechanics). In Dr. Reeder's opinion, Bolza's book on the calculus of variations is not easy to read; for teaching, Dr. Reeder preferred the excellent book by Gelfand and Fomin, and used it extensively in his courses.

Dr. Reeder, now 77 years old and retired, is living in New Orleans.

G.I. Taylor Memorial Lecture

Dr. James Rice, Gordon McKay Professor of Engineering Sciences and Geophysics, Department of Earth and Planetary Sciences and Division of Engineering and Applied Sciences at Harvard University will present the twenty-second annual G.I. Taylor Memorial Lecture on March 7, 1997. The title of his presentation is "Strong but brittle faults and the problem of earthquake occurrence at low overall driving stress."

Dr. Rice, whose primary field is solid mechanics, works on problems of stressing, deformation and fracture dynamics as they arise in seismology and materials physics. In his work in the earth sciences, he has contributed to the understanding of earthquake nucleation in relation to laboratory fault properties, and of factors controlling earthquake populations along faults, to the modeling of stress and seismicity in the lithosphere, and to the understanding of poroelastic effects in fluid-infiltrated earth materials. In work directed to problems of mechanical engineering and materials science, he has contributed to the understanding of crack propagation, especially in elastic-plastic metals, the structure of inelastic constitutive relations, microscopic mechanisms of cleavage and ductile or creep rupture, and the thermodynamics of interfacial embrittlement. Also, he has contributed to techniques of finite-element computational mechanics for inelastic and large-strain solid mechanics problems, and to spectral computational methods for crack and fault dynamics.

Department News

Honors and Awards

Since Jul '96, **Prof. M.A. Eisenberg** has been a Distinguished Visiting Professor (DVP) of Engineering Mechanics at the U.S. Air Force Academy in Colorado Spring. Under the DVP program, the Academy brings to their otherwise mainly military faculty, senior faculty from America's universities to encourage vigorous cross-institutional communication of pedagogical and technological concepts. The Air Force provides funds to the home university of the appointee to enable assignment of the appointee to full-time duty at the Academy. All cadets at the Academy, be they history, or psychology, or aeronautical engineering majors, are required to study statics and strength of materials. "Our best Air Force officers are truly liberally educated. An intriguing idea! Should Statics and Mechanics of Materials become part of UF's General Education Core?" questioned Dr. Eisenberg, who will return to UF in Fall '97.

Prof. M.A. Eisenberg was invited to lecture on "Application of multidisciplinary design optimization concepts to constitutive modeling" at the Northrop Grumman Advanced Technology Design Center in Bethpage, New York, Jun '96.

In recognition of their professional standing and successful practice, **Prof. M.A. Eisenberg** and **Prof. B.V. Sankar** have been elected to the grade of Associate Fellow of the American Institute of Aeronautics and Astronautics. AIAA is the premier aerospace professional society with more than 30,000 members from all over the world.

Prof. R. Haftka was invited to deliver the lecture titled "Optimization and experiments—A survey," co-authored with Prof. E.P. Scott of the Virginia Polytechnic Institute, at the International Congress of Theoretical and Applied Mechanics (ICTAM), held in Kyoto, Japan, 25-31 Aug '96. He was invited to visit and to lecture at the Hokkaido Institute of Technology in the week that followed. Immediately following his trip to Japan, Prof. Haftka was invited to give the same lecture at the Boeing company in Seattle.

Assist. Prof. C. Segal was invited to lecture on "Kerosene Combustion in Supersonic Flow at Mach 5 Flight Enthalpy—Flameholding and Thermal Efficiency" at the Wright-Patterson Air Force Base, May 1996.

Prof. M.D. Shuster was the AAS Technical Co-Chairman for the AIAA/AAS Astrodynamics Conference held in July '96 in San Diego California. The American Astronautical Society (AAS) is one of the two organizations that sponsors the conference every summer.

Prof. M.D. Shuster is recently elected to the Editorial Board of the Space Technology Library, a series of Engineering books published by Kluwer Academic Publishers in the Netherlands.

Attending also ICTAM, Kyoto, Japan, in Aug '96 was **Assoc. Prof. L. Vu-Quoc** who received a travel fellowship from the US National Committee on Theoretical and Applied Mechanics to present the paper titled "Modeling and simulation of dry granular flow," co-authored with Mr. Xiang Zhang, a doctoral student of Dr. Vu-Quoc, and Dr. Otis Walton of Lawrence Livermore National Laboratory.

On 24 Jun '96, **Assoc. Prof. L. Vu-Quoc** was invited to give a seminar on "Analysis of advanced multilayer capacitors" and to visit the facilities of the National High Magnetic Field Laboratory at the Florida State University in Tallahassee.

Dr. Deborah Weissman-Berman, Courtesy Scientist, presented an invited paper "Flexural Response of Sandwich Plates with Core as Elastic Foundation," co-authored with Mr. S. Lahiri, a graduate student, and Dr. R. Marrey, an alumnus, at the annual meeting of the Society of Naval Architects and Marine Engineers. The paper was the premier research effort presented at the Small Craft Committee of SNAME for 1996, and will be published in the Transactions of the Society. Recently, the American Bureau of Shipping adopted her formulation for beams on elastic foundation for its own use and for use by naval architects. It is noted that the ABS, in its history, rarely adopts results obtained outside the organization. Currently, she is also a Research Scientist at the Oceanographic Center, NOVA Southeastern University, Ft. Lauderdale, FL.

At the Industrial Advisory Board Meeting organized by the Engineering Research Center on Particle Science and Technology at UF, **Mr. Xiang Zhang**, a doctoral student working under the guidance of Assoc. Prof. L. Vu-Quoc, won a third-place (cash) prize on his poster presentation, titled "Modeling and simulation of dry granular flow," as judged by a panel of industry participants. The work was co-authored with Mr. Lee Lesburg (who is also a graduate student of Dr. Vu-Quoc). In addition to the technical contents, a criterion for the award selection was whether the student presenter could attract the attention of the audience to continue to listen to his/her technical presentation

beyond the first thirty seconds of the presentation.

Teaching activities

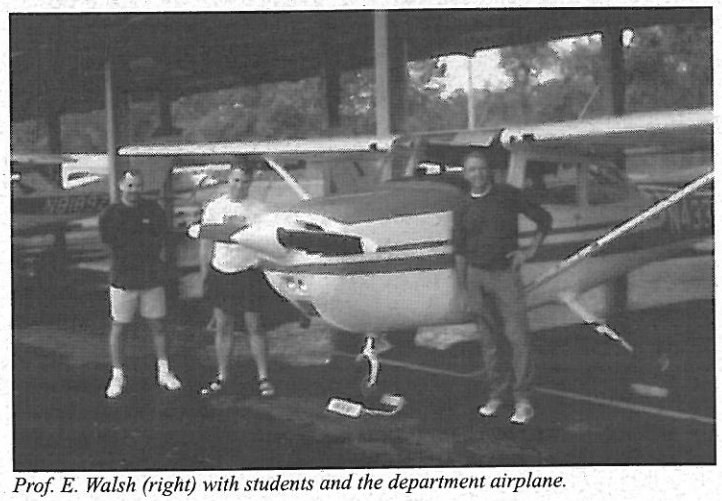
Flight Test Engineering

In a recent Government-Industry-University Roundtable in Seattle, WA, aircraft manufacturers outlined the desired attributes of an engineering graduate. The attributes include a sound understanding of engineering science fundamentals, a good understanding of design and manufacturing processes along with a multi-disciplinary, systems perspective. Students should have a profound understanding of and commitment to team work while maintaining the ability to think creatively and independently.

A group of professors at the University of Florida that includes **Assist. Prof. J. Abbitt**, **Prof. E. Walsh**, **Assoc. Prof. B. Carroll**, **Assoc. Eng. D. Jenkins**, and **Prof. Emer. R. Fearn** is developing a novel program that directly addresses these issues. The program is centered around a course called **Flight Test Engineering** where students are assigned a major project with only general goals stated in contrast to the traditional syllabus-based courses such as Statics and Dynamics. Students develop a project and carry it to completion by working independently in design teams, interacting with groups outside the course, manufacturing equipment and integrating systems. Flight Test Engineering is designed on a model similar to what might exist in a corporate aircraft company. An appropriate managerial group (in our case the faculty) defines a design problem and assigns the flight test engineers (the students in the course) to develop a flight test program to solve that problem. The flight test engineers define the experimental procedures based upon reports developed by the engineering staff, which in our case are the students in three other classes, Stability & Control, Aerodynamics, and Aircraft Structures. An instrumentation support branch provides technical support for the project, in industry. In our case the support branch is our laboratory course, Experimental Methods. Students in that class calibrate the instrumentation with wind tunnel tests and perform a structural analysis of instrumentation mounts and associated hardware. Finally, the Flight Test Engineering class flies the experiment, takes the data, analyzes and presents the results in written and oral reports.

The flight tests are conducted on an instrumented Cessna 172. With grants from the National Science Foundation, we have been able to install a computer data analysis and display system, camera pods for flow visualization, a 32-port pressure scanning system, a five-hole probe, a flight dynamics gyro system, and a global positioning system. Currently this instrumentation is used for ground track methods of airspeed calibration, for lift coefficient vs. angle of attack measurements including stall speed, for climb performance measurements, and stability and control experiments. We will soon be installing a telemetering system to transmit data to the ground for real-time analysis and control from a consortium of universities that currently include Auburn University, Georgia Institute of Technology, and North Carolina State University.

A special feature of the flight test program is the opportunity for the integration of undergraduates in research projects. As an example, we have a research program in which we are collaborating with McDonnell-Douglas to develop a technique to measure surface pressure distributions on aircraft in flight using pressure sensitive paint. A team of students in the Flight Test Engineering program designed, constructed, and installed much of the equipment on the aircraft necessary to support that project.



Prof. E. Walsh (right) with students and the department airplane.

Assist. Prof. J. Abbitt and the department airplane.

Research activities

Micro Aerial Vehicles

Several AeMES faculty members, including **Assoc. Profs. B. Carroll, N. Fitz-Coy, Prof. R. Haftka, Dr. Jenkins, Profs. W. Shyy, and E. Walsh** together with **Assoc. Prof. T. Nishida** from the EE department, have begun a research program on Micro Aerial Vehicles (mAV). This research is motivated by the conviction that unmanned aerial vehicles are a major growth area, and that miniaturization will allow us to build vehicles under one foot in wing span. Micro Aerial Vehicles (mAVs) with characteristic lengths under 6 inches, and flight speeds of 20 to 40 mph are potentially useful for many military and civilian applications. Advances in miniaturization of sensors, actuators and engines permit us to design and fly such mAVs, but for severe loss of aerodynamic performance. The aerodynamics of mAVs are substantially different from those of larger and faster aerial vehicles. First, operating at Reynolds numbers under 105, lift-to-drag ratios are substantially poorer and much more sensitive to variations in speed. Second, normal fluctuations in ambient wind speeds are comparable to flight speeds and hence cause large fluctuations in lift and drag. Consequently, there is need to improve aerodynamic performance of mAVs and make it less sensitive to flow fluctuations.

We are studying an adaptive wing concept to improve and stabilize the aerodynamic performance of mAVs by building wings from flexible membranes. In preliminary simulations of such wings, we have found that the flexibility of the membrane results in changes to wing shapes that improve lift to drag ratios. We expect substantial additional gains by augmenting this passive control with active shape control. However, active shape control must be integrated with the flight control of the mAV, and addressing this challenge is a major part of the proposed research.

In mid July, Drs. Fitz-Coy, Haftka, Jenkins and Shyy, visited the Naval Research Laboratory, where they found substantial and impressive activity in the area of mAV, and some prospects of future funding. In addition, Prof. R. Haftka launched an international competition in the area of mAVs, with the announcement listed at the end of this article.

Two teams of students, directed by Dr. D. Jenkins and Prof. E. Walsh are designing and building small airplanes that will enter the competition. In addition we have received requests for more details from about fifteen model aircraft enthusiasts and faculty members in other universities, including one from Australia and one from Israel. **We are seeking alumni's help** in organizing and judging the competition as well as in forming industrial connections for the mAV project.

ISSMO Micro Aerial Vehicles Competition

The International Society of Structural and Multi-disciplinary Optimization (ISSMO) is announcing a mAVs competition. The objective of the competition is to employ multidisciplinary design optimization

(MDO) to design and build the smallest aerial vehicle that can perform the following mission: (1) Fly and photograph a 1.5-meter size symbol on the ground located 600 meters from the launch site and hidden from view by a square enclosing fence 3.5-meter wide and 1.5-meter high. (2) Provide a legible image of the symbol to the launching individual at the launch site.

There will be two prizes awarded to mAVs complying with the competition rules. One $1,250 prize for the smallest AV. The other $1,250 prize for the design with best MDO that is no more than 1.5 times the size of the mAV winning the first prize. The competition will be held at a site on or near the University of Florida campus on 5 Apr 1997. For a copy of the competition rules, write ISSMO President, Prof. R. Haftka, AeMES, P.O. Box 116250, University of Florida, Gainesville, FL 32611-6250, or by e-mail: haftka@ufl.edu. Additional information also available at the ISSMO home page at http://www.aero.ufl.edu/~get/issmo.htm

Service to profession

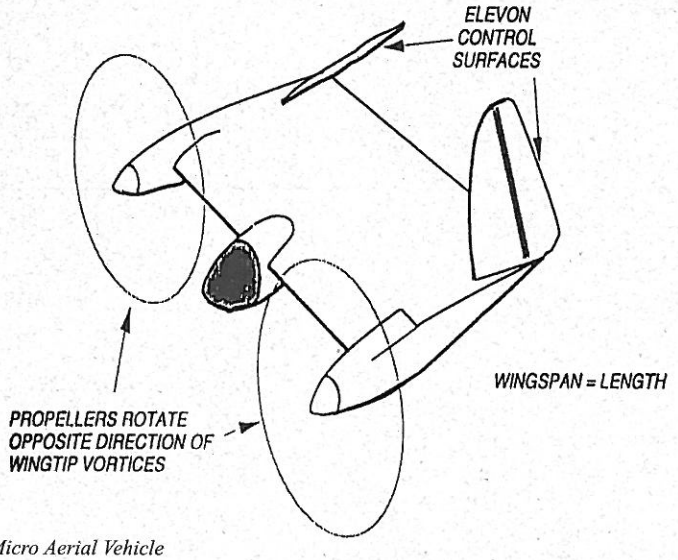
The text of the G.I. Taylor Memorial Lecture delivered by **Grad. Res. Prof. D. Drucker** on 22 Mar '96 on UF campus will appear in October issue of the Bridge, a publication of the National Academy of Engineering. His lecture has also been printed for distribution by the department. If you would like to received a copy of the lecture, please write to us (either by e-mail or by postal mail).

Prof. M.A. Eisenberg served as a member of the U.S. National Committee on Theoretical and Applied Mechanics, and attended the committee's meeting in Georgetown, Washington, D.C., May 1996. He also served as a review panelist for the National Science Foundation (NSF) CAREER Awards for young faculty members across the nation, Jan 1996.

Prof. R. Haftka co-organized with Prof. Bendsoe of Denmark a mini-symposium on structural optimization at the 19th International Congress on Theoretical and Applied Mechanics, Kyoto, Japan, Aug 1996.

In Aug '96, **Prof. W. Shyy** was invited to NSF to serve as a member of the Committee of Visitors (COV) to review NSF's State/Industry/University Cooperative Research Centers (S/I/UCRC) program. The S/I/UCRC Program was established in 1991 as a joint NSF/State/University initiative to support cooperative research centers that address technology development relevant to the economic interests of the states.

Assoc. Prof. L. Vu-Quoc was invited to serve as a member of a review panel for the NSF Dynamic Systems and Control Program to advise NSF on proposal funding. The panel met at NSF in Arlington, VA, in Jul '96.



Micro Aerial Vehicle

Students activities

Sigma Gamma Tau

This year, the society is beginning an exciting research project in the field of rocketry, which involves the design and construction of a solid fuel rocket. An extension of the project will include research into the field of hybrid solid-liquid fueled rockets. This should provide an important learning and outreach opportunity for all participants. The project will be showcased at the annual University of Florida Engineering Fair.

Sigma Gamma Tau is also planning our annual fall semester departmental picnic at Lake Wauburg. This will take place on November 24. The picnic provides a casual forum for students and faculty to interact.

Biomedical Engineering Society

As of April, the BMES 1996-1997 academic year elected officers are Marina Santarpia (president), Tiffany Sheldon (vice-president), Shaun Saint (secretary), and Chris Izzo (treasurer). BMES Advisors are Dr. Roger Tran-Son-Tay, Dr. Edward Walsh, Dr. Harold Doddington, and Dr. Robert Hirko. You can contact the society officers at marina@grove.ufl.edu.

BMES recently returned from the National BMES Conference at Penn state. There, members Chris Izzo and Jeff Willis presented a poster on the viscoelastic properties of erythrocyte membranes. They received the prestigious Whitaker Senior Design Project Award for their research, under the supervision of Dr. Roger Tran-Son-Tay and Dr. John Garcelon. The UF chapter also took home a Commendable Chapter Award for their abundant activities during the 1995-1996 academic year.

Currently, BMES is planning the first annual AeMES faculty vs. students athletic event. The members will vote on which sport they enjoy most, basketball or baseball, at their October 24th meeting. Future BMES meetings will be held on Nov. 7 and Dec. 5, both at 6 pm. in CSE E107.

Other activities

The following students received scholarship awards for 1996-1997:

- **Ms. Lisa D'Amico**, *Engineering Deans Scholarship*
- **Mr. Galen P. Hegarty**, *P.M. Pope Scholarship*
- **Ms. Cheuk Lam**, *A.C. Pound Scholarship*
- **Ms. Evelyn M. Orozco**, *Henry Bauch Scholarship*

These students were recognized at the annual College of Engineering Awards and Recognition Ceremony, on 23 Apr '96 in the Arredondo Room of the J. Wayne Reitz Union.

Mr. Ashish Ghai, an undergraduate in our department, was recently recognized as a *1996 Anderson Scholar with Highest Distinction* at the 1996 University of Florida Fall Convocation. The convocation honors UF undergraduates from all departments that have maintained a 3.8 GPA (or above) for their first two academic years. Ashish was one of only 26 students to achieve the Highest Distinction recognition for his 4.0 GPA.

Assoc. Prof. B. Carroll and **Dr. P. Hubner**, a postdoctoral researcher working with Dr. Carroll, were named as 1996 Anderson Scholar Faculty Honorees by Ashish.

In addition, several important awards were made to students and faculty at the annual awards banquet last April. The recipients of all of these awards are recognized by having their names added to plaques displayed in the Department.

Ms. Susan A. Welsh received the seventh annual honor undergraduate student award in Aerospace Engineering at the University of Florida. This award is sponsored by Sigma Gamma Tau, the national aerospace honor society. Susan graduated last May and is currently a graduate student at Georgia Tech.

The fourth annual Knox Millsaps Award for the outstanding technical paper presented by an undergraduate student was made to **Mr. Edward R. Rambali**. His paper, entitled "Fracture Toughness of Stitched Graphite/Epoxy Laminates," was presented at the annual Southeastern Regional Student AIAA Conference held in Savannah Georgia last April. Ed's mentor for this work was Dr. B. Sankar. The award included a framed certificate and a cash award of four hundred dollars. Ed is currently a senior in Aerospace Engineering and plans to graduate in December. Honorable mention awards of two hundred dollars each were made to **Mr. David McCormick** and to **Mr. John Avery**.

The initial Knox Millsaps Award for the outstanding graduate-student teaching assistant was made to **Mr. Vivek Jayaraman**. Selection for the recipient of this award is based primarily on student evaluations and recommendations from the undergraduate professional and honor societies. The award included a framed certificate and a cash award of four hundred dollars. Vivek completed the requirements for a

Master's Degree in Engineering Mechanics in August and will receive the degree in December. He is currently working at Parametric Technology Corporation in Woltham, Massachusetts. Honorable mention awards of two hundred dollars each were made to **Mr. Dwayne McDaniel** and **Mr. Joseph DeLong**.

The students in our Department selected **Assoc. Prof. B. Carroll** to receive the thirteenth Raymond Bisplinghoff Award for Outstanding Teacher of the Year. This is the third time Dr. Carroll has been honored with this award.

Congratulations

Congratulations to **Mr. Joe DeLong** and his wife, Nicole, who were married to each other on 6 Jul '96 in Orlando, Florida. Joe is a graduate student working under the supervision of Assoc. Prof. N. Fitz-Coy.

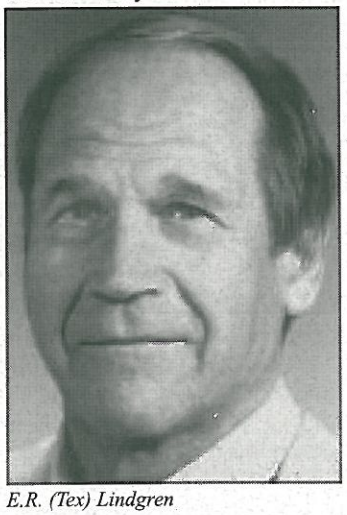
Mr. Carlos A. Fuentes is happy to announce his wedding with Lissette Sequeira on 7 Dec '96 at the Saint Peter and Paul Catholic Church, Miami, FL, with a reception to follow at the Vizcaya mansion also in Miami, FL. Carlos is a graduate student working under the supervision of Assist. Prof. J. Abbitt.

We share the joy with **Dr. Paul Hubner**, and his wife, Brook, for the birth of their son, Jack Lansing Hubner, on 5 Jun '96. Paul is a Postdoc working with Assoc. Prof. B. Carroll. Jack tipped in at 7 lbs., 9 oz., and was 20 ° inches long. Both Jack and his mother are doing fine.

Our warm congratulations to **Prof. Emer. Charles E. Taylor** and to his wife, Nikki, for the Golden Anniversary of their wedding, which is coincident with the Golden Anniversary of the founding of the AeMES department. It was a double celebration for all of us!

Retirement

Prof. E.R. (Tex) Lindgren retired at the end of Spring '96 semester. He will continue his appointments with the University of Florida and the



E.R. (Tex) Lindgren

Royal Institute of Technology in Sweden on a part time basis. One of his priorities now is to complete his textbook on mechanics.

Dr. Lindgren received the degree Technologie Doktor from the Royal Institute of Technology in Sweden in 1957. He has continued his association with the Royal Institute since his graduation, currently spending a few months each year there as a Visiting Professor of Mechanics. From 1961 to 1963, Dr. Lindgren was a Visiting Professor of Mechanics at Johns Hopkins University in Baltimore, and from 1963 to 1965 he was an Associate Professor of Civil Engineering at Oklahoma State University in Stillwater, Oklahoma. He joined the Engineering Mechanics Department at the University of Florida in 1965.

Dr. Lindgren's research interests are in the areas solid and fluid mechanics. His publications were focused on the fundamental concepts of mechanics and on experimental fluid mechanics.

Alumni news

Don Ely, MS '84, is currently with the checkout systems application software group of McDonnell Douglas at the Kennedy Space Center, where he is developing software to verify the Space Station interfaces on the Test Control and Monitor System. From 1984 until he joined McDonnell Douglas in 1990, Don worked at the Space Astronomy Lab at UF on the Shuttle Activation Monitor experiment, and on gamma ray measurements of SN 1987a, the first supernovae discovered in 1987. Don recently received his MA in Computer Resource and Information Management from Webster University in May '96.

Michael K.H. Leung, MS '92, is currently a research associate at the University of Hong Kong. He completed his Ph.D. in ME at UF in 1995, and a postdoctoral work for one year until Sep '96. Michael has been working on heat transfer, thermodynamics and HVAC.

Suresh K. Sharma, M.S. '94, was recently awarded a special managerial award for recognition of his significant contributions in the area of life cycle analyses of aircraft engines at GE Corporate Research & Development. Normally, such awards are presented to individuals for consistent excellent performance over a period of several years.

Tianxi Tang, Ph.D. '90, is currently with the Engineering Materials Division of the Texas Transportation Institute, where he is working on mechanical properties of concrete. Before joining TTI, Tianxi was a postdoctoral fellow at the NSF Center for Science and Technology of Advanced Cement-Based Materials, Northwestern University. He has developed a number of test methods to determine the fracture parameters in concrete, interface fracture between aggregate and mortar, etc. He also studied the behavior of concrete pavement joint sealants under the effects of time, temperature and large deformation.

Craig Young, MS '95, is currently with GE Aircraft Engines Marine and Industrial Field Service Office in Tampa, FL. His previous assignment was with GE Aircraft Engines (Cincinnati, Ohio) Combustion Center of Excellence, and Pratt and Whitney Government Engines and Space Propulsion.

Editor's note to alumni: *Please send your news to us. We'll do our best to put your news in the newsletter, if not in the coming issue, then in subsequent issues.*

Job openings

We recently learned from two visitors from Boeing, Dr. G.K. Queitzsch (senior principal engineer in the Propulsion Group) and Mr. B.D. Grant (Manager of Machining & Metallurgical R&D) that Boeing is looking to hire immediately 1,800 engineers.

UNIVERSITY OF FLORIDA

Aerospace Engineering, Mechanics & Engineering Science
PO Box 116250
Gainesville FL 32611-6250