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Contributions to the newsletter are always welcome. If you have news that would be of interest to other CEEs or your classmates, please send it to us so it can be included in a future edition.

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# Louisiana State University



## CIVIL AND ENVIRONMENTAL ENGINEERING

Volume 5 Fall Issue

October 2005

### Message from the Chairman

**Dr. George Z. Voyiadjis,**  
**Boyd Professor, Chairman and Bingham C. Stewart**  
**Distinguished Professor**



I welcome you this Fall with many events occurring in our Department, the University, and the State. During the recent hurricanes, Katrina and Rita, our department faculty and staff assisted in the efforts in the evacuation process, especially during Hurricane Katrina. A brief summary of our efforts is outlined as follows. Dr. B. Wolshon spearheaded Hurricane Evacuation prior to the event which helped in the evacuation efforts during Katrina. Dr. J. Suhayda predicted the Katrina Event five years ago with all its devastation. This was in National Geographic Magazine, Discovery Channel, etc. Dr. I. Van Heerden and M. Levitan organized the LSU Hurricane Center efforts in conjunction with Hurricane Katrina. They provided operation support at the Office of Emergency Preparedness. Dr. J. H. Pardue published the first detailed article on the environmental impacts due to Hurricane Katrina. Dr. R. Dokka is studying the subsidence and its effect on storm water surge. Dr. R. Sharma is on the State Committee investigating the Dykes and Levee failures. Drs. Levitan and Roy were invited to give a Congressional Testimony on Hurricane Katrina. It is noted that Department faculty and staff have been the subject of many hundreds of interviews to national and international media outlets.

The Department has re-organized itself and has thus provided a leadership role for the State in three major areas: Coastal Engineering, Environmental Engineering, and Infrastructure.

Two new faculty members joined our Department this Fall: Dr. Radhey S. Sharma as an Associate Professor, and Dr. Guoping Zhang as an Assistant Professor, both in Geotechnical Engineering. We welcome both of them to our Department.

Finally, this Fall saw the retirement of Dr. Roger K. Seals after a 41-year career in professional education. He served as Chairman of the Department for nine years, then as Director of the Institute for Recyclable Materials for another nine years. We wish him well in his future endeavors.

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# CEE Welcomes Two New Faculty Members



**Dr. Guoping Zhang** joined the Department of Civil and Environmental Engineering at LSU as an Assistant Professor in Fall 2005, after having been a lecturer at the University of Nottingham, UK for three years. He obtained his Ph.D. in Geotechnical and Geoenvironmental Engineering (with a minor degree in Materials Science) from Massachusetts Institute of Technology in 2002, and his M.S. in Geotechnical Engineering and two B.S. degrees (Hydraulic Engineering and Mechanical Engineering) from Tsinghua University (China). He had also worked for two years as a research engineer at Chinese Academy of Building Research before he resumed his graduate education at MIT.

Dr. Zhang has more than ten years of experience in geotechnical engineering research and practice. His previous research mainly focused on the behavior of natural soils (including highly weathered alluvia, residual soils, soft clays, deep seabed clays from the Gulf of Mexico, swelling clays, and artificially cemented clays), experimental investigation of the micro- and nano-scale particle-level interactions to understand the macroscopic engineering properties of soils, and the development of advanced laboratory testing equipment. Particularly, in his doctoral thesis research that aimed to understand the unusual behavior of a highly weathered old alluvium in San Juan, Puerto Rico, he developed some novel methods to determine explicitly soil composition and microstructure, and hence successively linked the engineering behavior to the microstructure. He is among the first who adopted environmental scanning electron microscopy (ESEM) and atomic force microscopy (AFM) to study soil microstructure and clay micromorphology. Research results have been used by local consulting firms and the transportation department of Puerto Rico to guide the design and construction of future civil infrastructure development, such as dams, tunnels, highways, and slopes. Dr. Zhang has published more than 15 papers in international leading journals and conference proceedings.

At LSU, he plans to study the behavior of the soft coastal clays and Mississippi River deposits, and to develop new technologies to alleviate the coastal erosion problems in Louisiana, by collaborating with the faculty in CEE or other departments. With his expertise in micro- and nano-characterization and experience in laboratory testing, his current research has two focuses: (1) to understand the nano-scale cohesion forces between clay-clay particles and between clay particle and binding agents (such as cations, oxides, organics, polymers), especially under erosion influences; and (2) to develop experimental methods and equipment to assess and measure the erodibility of costal clay deposits. Another direction of his future research is to study the coupled geomechanical and geochemical problems related to carbon dioxide geosequestration with enhanced oil recovery in oil reservoirs. He hopes, through the study of nano-scale particle-particle and particle-polymer interactions, to improve the understanding of the true behavior and engineering properties of soft clays and deep seabed clays from the Gulf of Mexico, and apply the new findings to soil improvement and the design and construction of civil infrastructure in Louisiana.

# ALUMNI

The Department of Civil and Environmental Engineering wants to know where life has taken you. Who are you working for and what is your title? Have you received any recognition for your work? Are you working on an especially challenging project?

Please complete the following information and attach any additional comments you may have. Space permitting, we would like to use photos of you, your family or your latest project.

Please e-mail your information with attached photos to [trisha@eng.lsu.edu](mailto:trisha@eng.lsu.edu), fill out an online form at [www.cee.lsu.edu/~ceenews](http://www.cee.lsu.edu/~ceenews), or mail your submission to: Civil and Environmental Engineering, LSU, 3418 CEBA Building, Baton Rouge, LA 70803-6405.

## CEE ALUMNI INFORMATION

Name: \_\_\_\_\_ Degree: \_\_\_\_\_ Year: \_\_\_\_\_

Home Address: \_\_\_\_\_

Home Telephone: \_\_\_\_\_ Email: \_\_\_\_\_

Position Title: \_\_\_\_\_

Firm: \_\_\_\_\_ Business telephone: \_\_\_\_\_

Business Address: \_\_\_\_\_

Your News: \_\_\_\_\_

## Alumni Corner

**Jim Worrell (BSCE, 1963) – After retiring as a rigging engineer and manager, he became affiliated with Becht Engineering Co., Inc. as a senior heavy-lift advisor.**

**Gavin P. Gautreau (BSCE, 1993) – He has been named President of the Baton Rouge Chapter of the Louisiana Engineering Society. He is employed as the Geotechnical Research Manager at the Louisiana Transportation Research Center (LTRC).**

**Natalia Bohorquez (MS, 2001) – She is working on climate change and clean energy project in Venezuela.**



### CEE and ASCE Welcome Displaced New Orleans Students

The devastation caused by Hurricane Katrina has affected the entire state in many ways. As a leader, LSU stepped up to the plate and was vital in providing many services to the relief efforts that went on in the immediate aftermath of the storm. It was clear from the magnitude of the disaster that many New Orleans universities will not be operating normally for an extended period of time. As a result, almost 3000 displaced students from the New Orleans area joined LSU and registered for classes to avoid missing an entire semester. Our department, in collaboration with the College of Engineering and ASCE regional sections, tracked thirty-three students who enrolled in Civil and Environmental Engineering classes. Dr. Steven McCutcheon, ASCE regional district, worked diligently to identify students with urgent needs, such as accommodation and transportation and conveyed these needs to different parties who helped in finding parties capable of addressing some of those needs. The local ASCE chapter prepared a database of jobs in the Baton Rouge area for students who are interested in working part-time while pursuing their studies. Our ASCE student chapter also helped in welcoming the new students by inviting them to chapter meetings. The new students are participating in the current activities, and some of them even joined the local chapter in their last visit to Tiger Stadium! The College of Engineering also organized an event to welcome New Orleans students and invited the Dean of Engineering, UNO, and other faculty from UNO and Tulane. The dean's staff answered the students' questions.

Our efforts to make the students stay at LSU as smooth as possible are still ongoing. It is our chance to leave a positive impression. Some of these students will graduate in December and the last memories of their college education will have the colors purple and gold!

**Dr. Mehmet T. Tumay** gave the following lectures while in Korea: "Cone Penetration Technology – Past, Present ... Future," *Invited Keynote Lecture* at the National Meeting of the Korean Society of Geotechnical Engineering, Seoul, Korea, June 24, 2005; Korean Advanced Institute of Science & Technology (KAIST), Daejeon, Korea, June 20, 2005; Korean Institute of Water and Environment (KIWE), Daejeon, Korea, June 21, 2005; Samsung Institute of Construction Technology, Seoul, Korea, June 22, 2005.



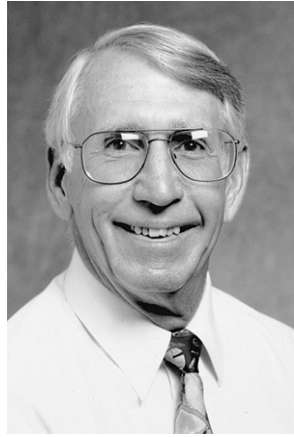
**Dr. Radhey S. Sharma** has joined the Department of Civil and Environmental Engineering at LSU as an Associate Professor. Prior to joining LSU, he was at Iowa State University. He is an accomplished researcher and teacher. He has worked for 7 years as a faculty member in the U.S. and England besides working in industry for 9 years. With this varied experience, Dr. Sharma comes with a perspective of Civil Engineering education and research in national and international context. Dr. Sharma received his Ph.D. in Geotechnical Engineering from the University of Oxford; M.S. in Soil Mechanics and Environmental Geotechnics from Imperial College, London; M.Tech. in Rock Mechanics from Indian Institute of Technology, Delhi; and B.S. in Civil Engineering with first class honors from AMU, Aligarh, India.

Dr. Sharma is an international expert in unsaturated soils and serves on the editorial boards of a number of journals including the ASCE Geotechnical and Geoenvironmental Engineering. He is serving on top national and international committees including TC6 (Unsaturated Soils) of the International Society of Soil Mechanics and Geotechnical Engineering. He has delivered several keynote and invited lectures worldwide. Dr. Sharma's research program is focused on both fundamental and applied aspects of geotechnical and geoenvironmental engineering. Specific interests include static and dynamic behavior of unsaturated and saturated soils and rocks; laboratory, in situ, field testing and instrumentation of geomaterials and geoinfrastructure including highway embankments; geotechnical earthquake engineering, especially aimed at the geoinfrastructure analysis and design involving unsaturated soils; ground improvement; geoenvironmental engineering; and coastal & offshore geoenvironmental engineering. His geoenvironmental research involves migration of hydrocarbons, especially non-aqueous phase liquids in saturated and vadose zones and behavior of containment systems.

Dr. Sharma has received a number of awards and honors and last year he was awarded the top civil engineering award "Telford Medal" by the Institute of Civil Engineers, London. He won this honor for his research on "Coupling of hydraulic hysteresis and stress-strain behavior in unsaturated soils," which presents a new framework for understanding and modeling the mechanical and hydraulic behavior of unsaturated soils. The new framework is able to explain and model a number of aspects of the mechanical behavior of unsaturated soils that could not be represented by existing models. This could have important implications for the analysis and design of a wide variety of geotechnical works involving unsaturated natural soils and compacted fills. This work has direct relevance to the U.S. climatic conditions. Poor understanding of unsaturated soils behavior results in damage of billions of dollars annually through the failure of foundations and highway embankments and landslides.

Geotechnical and Geophysical Engineering at LSU is highly regarded at local, national, and international levels and with Dr. Sharma joining the group with his high quality educational background, outstanding scholarship, teaching, excellent service record, and organizational skills, the geotechnical group is poised for an exciting time.

# Dr. Roger K. Seals Retires



Dr. Roger K. Seals, Irma-Louise Rush Stewart Professor of Civil and Environmental Engineering, ends a very satisfying 41-year career as a professional educator with his official retirement from LSU on August 1, 2005. In fact, following the award of his B.S. degree at the University of Florida in 1961, he started his academic career even earlier as a teaching assistant and Ford Foundation Scholar during his graduate school years at the University of Florida (M.S.E., 1963) and North Carolina State University (Ph.D., 1967). For 15 years beginning in 1965, he worked his way through the ranks at West Virginia University, becoming Professor and Coordinator of the Soils/Materials Group in the Department of Civil Engineering. While there, he received Outstanding Teaching Awards from the Department, University and WVU Foundation. In 1980, he was hired as Department Chair of Civil Engineering by Louisiana State University, primarily to assist faculty in enhancing their research

efforts. With his guidance, but largely due to the efforts of the faculty during his tenure as chairman, the Department experienced a major expansion of its research and graduate programs. Then, he spent his latter years encouraging faculty to balance their research and teaching efforts.

Serving as Department Chair for nine years, he was most gratified by the major revision of the undergraduate curriculum to more accurately reflect the broader and more dynamic needs of the profession. He also fostered the continued growth of the environmental engineering component of the Department that eventually resulted in the name change to "Civil and Environmental Engineering" and establishment of a B.S. degree program in Environmental Engineering. He was instrumental in establishing the Frank J. Germano Design and Computation Center which provides a computational laboratory, technical support, a project design classroom and study space for use by undergraduate students. Also during his tenure as chairman, Dr. Seals chaired the College of Engineering Task Force on the Development of a Transportation Research Center (1984-85) which ultimately led to the establishment of the Louisiana Transportation Research Center. In collaboration with Dr. Elvin J. Dantin in 1982, Dr. Seals wrote the proposal that resulted in establishing the Environmental Protection Agency Hazardous Waste Research Center of Excellence at LSU.

Dr. Seals then served as the inaugural Director of the Institute for Recyclable Materials (IRM), sponsored by a major gift from the Freeport McMoRan Corporation of New Orleans. As Director of IRM from 1990 to 1998, he promoted and participated in research in such areas as recycling, waste management, the properties and behavior of recycled plastic lumber, and utilization of phosphogypsum as a construction material and for marine applications. During this period, he had a significant role in the establishment of the Environmental Research Consortium and served as its chair in 1996-97. He was also a member and chaired the Scientific Advisory Committee of the EPA Urban Waste Management Center at the University of New Orleans (1997-99).

In 1998, he became the Undergraduate Environmental Engineering Program Coordinator which ultimately led to his appointment as the Undergraduate Programs Coordinator for both the Civil and Environmental Engineering Programs. As Coordinator, he led the effort to develop and implement the continual improvement strategy for the undergraduate programs. He served in that position until 2003 at which time he accepted a rotator position as Program Director in the Division of Undergraduate Education at the National Science Foundation. In that position, he served as the assistant lead director for the Distinguished Teaching Scholars Program and as one of the directors of the STEM Talent Expansion Program, the Advanced Technology

# LSU TEAM FUNDED BY NSF TO STUDY KATRINA IMPACTS

The National Science Foundation recently awarded Drs. Marc Levitan, Steve Cai, Ayman Okeil, and Ivor van Heerden a grant to study the impacts of Hurricane Katrina on the human and built environments. The grant supports the effort to document damage and collect perishable data. The focus of LSU's effort will be on two of the most catastrophic and unique aspects of this storm: (1) the loss of life due to storm surge, and (2) the damage and destruction of numerous short- and medium-span bridges due to surge and waves. The research team has collected site information and some preliminary analysis will be carried out to understand why the bridges collapsed and how to improve future designs for low-lying coastal bridges.



Damage to I-10 (twin span near New Orleans, LA)



Damage to US 90 (St Louis Bay, MS)



I-10 looking from south towards Slidell. Note that the span shifted towards east because the bridge is located on the left side of the hurricane eye.



US-90 looking from Ocean Spring towards Biloxi. Note that all span shifted towards the west (opposite to the I-10 bridge) since the bridge is located on the right side of the hurricane eye.



Many failures revealed bad detailing.



Typical bearing failure due to the lateral shear.

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Dr. Seals continued to teach throughout his career, even as an administrator, and was named Teacher of the

Education Program, the National STEM Digital Library Program, and the Course, Curriculum and Laboratory Improvement Program.

Dr. Seals continued to teach throughout his career, even as an administrator, and was named Teacher of the Year by the Department in 1994. He also received the Louisiana Engineering Foundation Faculty Professionalism Award (1992) and the LSU Chapter of Chi Epsilon Excellence in Teaching Award (1993). He was honored by being elected as a Chi Epsilon Chapter Honor Member at both West Virginia University and Louisiana State University. He is quick to remark that it was his interaction with students that gave him the most pleasure. He directed more than 45 graduate students in pursuit of their MS and PhD degrees. He remains in touch with many of them and it's not uncommon for former students to look him up at conferences.

Dr. Seals has made significant contributions in both technical and educational research. The major areas of technical research included the utilization of industrial residuals as construction materials, the properties and behavior of recycled plastic lumber, and the utilization of cement stabilized phosphogypsum for marine applications. Educational interests included ethics and professionalism, active learning, use of problem settings for laboratories, and capstone design courses.

More than 50 journal and proceedings papers and 18 research and technical reports were authored or co-authored by Dr. Seals. He (in association with other authors) received a 1984 publication award from American Society for Testing Materials (ASTM) and a 1990 Best Paper Award from the Civil Engineering Division of the American Society for Engineering Education (ASEE). He's developed and shared many exceptional courses. His capstone design course is cited as a model by other teaching professionals. He's made numerous presentations encompassing research, professional and teaching topics, the most recent being the description of a comprehensive capstone design course at an international education conference in Spain. Roger has served as chair or member of over 50 committees, both academic and professional. At the University level, he served on a number of committees including the Faculty Senate Committee on Improvement of Instruction. That committee laid the groundwork for what is now the Center for Faculty Development. At the community and state level, he served on the Horizon Plan Committee for East Baton Rouge Parish and the state's Project Restore Task Force.

Dr. Seals has held a number of local, state and national leadership positions with the American Society of Civil Engineers (ASCE) and was named a Fellow in 2003. He served as chair of the ASCE National Committee on Curriculum and Accreditation (1984-85) and of the ASCE National Committee on Research in Civil Engineering Education (1985-87). In addition, he also served as President of both the West Virginia Section (1974-75) and the Baton Rouge Branch (1992-93) of ASCE. He was an ABET Program Evaluator from 1982-87. He was also chair of the Civil Engineering Division of the American Society of Engineering Education (1984-85). More recently, Roger served as chairman of the Cementitious Stabilization Committee of the Transportation Research Board from 1998 to 2004. He's also held committee positions with ASTM, National Society of Professional Engineers and the Louisiana Engineering Society. He is a Registered Professional Engineer in the State of Louisiana.

Roger plans to build a small second home on Perdido Bay in Alabama and spend some time sailing and enjoying his family. His wife, Saralene, retired from the LSU Agricultural Center's Cooperative Extension Service in 2000, his daughter Allison is a certified project manager with Methods Technology Solutions in Baton Rouge, and his daughter Susanna hopes to be teaching kindergarten or first grade in Baton Rouge soon. Granddaughter Jessica, the light of his life, is a freshman at the University of Southern Mississippi.

Dr. Seals is looking forward to a continued relationship with LSU in its efforts to improve engineering education and research.

# HURRICANE KATRINA

## LSU Hurricane Center

Research efforts by the LSU Hurricane Center and partners provided support to the state of Louisiana in many ways throughout Hurricane Katrina, August 29, 2005. These ranged from mitigation prior to the storm, operational support and response during the storm and follow-up research & damage assessment post-Katrina. Researchers within the Hurricane Center are currently involved in recovery and rebuilding of a more hurricane-resistant coastal Louisiana and city of New Orleans.



*Hurricane Katrina approaching New Orleans as a Category 5 storm. (NASA Earth Observatory)*

The LSU Center for the Study of Public Health Impacts of Hurricanes (CSPHIH) (a Louisiana Board of Regents funded Center, 2001) has been conducting research more specifically tailored to the hurricane vulnerability of the greater New Orleans metro area. Hurricane Katrina struck New Orleans in the fourth year of this five year pilot study, but not before substantial progress had been made across many research areas which include the following: experimental storm surge modeling with the ADCIRC prediction model, evacuation studies, improved satellite and meteorological capabilities, New Orleans population surveys, research on wind damage to petrochemical structures, water and air contaminant modeling, public health aspects and animal evacuation, creation of a New Orleans GIS database, flood casualty modeling.

## Evacuation Studies by Dr. Brian Wolshon

One very active research area in the department over the past several years has been in the field of evacuation traffic operations and planning. Research and modeling work conducted by Dr. Brian Wolshon since the evacuation of New Orleans for Hurricane Georges in 1998, has allowed him to identify numerous methods to increase the effectiveness of regional evacuations, most notably in the application of contraflow freeway operations.

Over the past five years, Dr. Wolshon has served as an advisor to the National Academy of Engineering and as an expert lecturer for the Federal Highway Administration on the subject of evacuation traffic operations. In 2000, he founded and continues to chair the Transportation Research Board's Subcommittee on Emergency Evacuation and has been invited by the American Society of Civil Engineers to serve as the Guest Editor for its upcoming Emergency Transportation Issues of the *Journal of Urban Planning and Development*.

On a local-level, his research was put to use by indicating several areas that could be strengthened in the southeast Louisiana regional evacuation plan. Several of these issues, including problems that were likely to occur during the loading and unloading of the contraflow segments of Interstate 10 in New Orleans were unfortunately later realized during the Hurricane Ivan in 2004. In the months that followed Ivan, Dr. Wolshon served as a consultant to the joint Louisiana Department of Transportation and Development /

Louisiana State Police evacuation task force to revise the plan prior to the 2005 hurricane season. Using the findings of his research models as well as lessons learned from reviews of other state practices, Dr. Wolshon was able to advise the task force on methods to enhance the highway-based evacuation of metropolitan New Orleans. The efforts work of this task force resulted in a new and updated plan to evacuate New Orleans only months prior to Hurricane Katrina.

In contrast to Ivan, the highway evacuation of southeast Louisiana prior to Katrina was notably improved and highly successful. Dr. Wolshon's preliminary analysis of traffic volume data recorded during the evacuation shows that the evacuation time of city appeared to have been cut nearly in half, exceeding the most optimistic prior projections by at least 40%; that is, an anticipated 72 hour evacuation was able to be executed in 28-36 hours. While the total number of evacuees out of New Orleans and Southeast Louisiana is still being calculated (current estimates range between 1-1.2 million), the Florida Department of Transportation is now looking into applying Dr. Wolshon's research findings to better prepare the State of Florida in future storms. Dr. Wolshon's future research plans will seek to improve the evacuation of low-mobility population groups as well as to better prepare urban centers across the world for both natural and man-made disasters.

## Katrina approaches: LSU Hurricane Center operational support

The LSU Hurricane Center, Earth Scan Lab and Southern Regional Climate Center went into full operation at the state Emergency Operations Center (EOC, Baton Rouge) 2-3 days prior to the storm. LSU researchers provided briefings approximately every three hours on such topics as: satellite storm tracking (ESL), local meteorological conditions and expected rainfall (SRCC), ADCIRC surge model forecasting, estimated overtopping and flood depth (CSPHIH), wind damage estimates and questions on shelters of last resort (LSU HC), consultations on evacuation and sheltering (LSU HC).

Many LSU Experts and Speakers were requested by the media as Hurricane Katrina approached and made landfall. Public relations activities included hundreds of interviews to national and international media outlets, network news programs including ABC, NBC, CBS, CNN, MSNBC, Larry King Live, Meet the Press, Documentaries on Discovery Science Channel, National Geographic, BBC radio, NPR, Public Television, AP Newswire, DowJones Newswire, Reuters Newswire, Time Magazine, US News and World Report, New York Times, Washington Post and many, many more.



*Dr. Ivor van Heerden discussed the New Orleans levee situation with Tim Russert on NBC's "Meet the Press" (9/25/05).*

## After the storm: Hurricane Katrina response, recovery and research

In the days following the storm, the LSU Hurricane Center, as with many other centers throughout LSU, posted links to crucial hurricane information on their website; fielded many calls from affected area residents, government agencies, other universities, and the media; and supported visiting and displaced researchers (such as from UNO and LSUHSC) by sharing office and home space, while collaborating on projects and strategies for how to best remedy and move forward after the devastation that occurred New Orleans.

*Continued on Page 8*