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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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Please contact Dr. George Z. Voyiadjis for more details.

Civil and Environmental Engineering
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3418 CEBA Building
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CIVIL AND ENVIRONMENTAL ENGINEERING

Volume 3 Fall Issue November 2003

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Message from the Chairman

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

ABET ACCREDITATION. In September the department was visited for three days by two ABET accreditation teams. One team focused on the Civil Engineering undergraduate curricula while the second team focused on the Environmental Engineering undergraduate curricula. ABET accreditation is very important to the department, its students, employers of our graduates, and other constituencies. Accreditation now involves a continuous improvement process which ensures our curricula in Civil and Environmental Engineering are relevant and meet the expectations of the profession. At the end of the three day visit, the ABET evaluators provided a preliminary report that recognized the merits of our objectives, goals, and curricula for providing a strong, relevant educational experience for our graduates. The final report from ABET is not expected for several months, but we are anticipating that both curricula will be accredited for the maximum six year period prior to the next mandatory accreditation visit.

FACULTY ADDITIONS. This academic year three new faculty members joined the department, Drs. Z. Deng and F. Tsai, in water resources, and Dr. A. Okeil in structures/mechanics. As noted in an earlier newsletter, Drs. Mohamed Alawady and Joe Suhayda retired from the faculty during the previous academic year. With the addition of the three new faculty members, the department faculty now totals thirty members, the largest number in its history. The additional faculty members strengthen the department, allowing it to have a more diverse group of faculty that can better address the complete list of undergraduate and graduate courses in Civil and Environmental Engineering, as well as helping strengthen our research clusters. The research clusters enhance the department's ability to form interdisciplinary research teams to compete for larger nationally prominent grants and contracts.

LABORATORY ADDITIONS. The department recently was allocated space that was renovated for Geoinformatics, a relatively new research area that is under the direction of Dr. Roy Dokka. In addition, the final plans for our extended Environmental and Structures laboratory facilities in the Engineering Laboratory Annex have been approved. The facilities are scheduled to be available in about eighteen months.

Undergraduate Students and Research at the Department of Civil and Environmental Engineering

Last summer, eleven students completed the Third Year of the NSF/REU program in our department. The program is headed by Dr. C. Willson (current PI), Dr. R. Seals (past PI) and a number of other faculty in Department Civil and Environmental Engineering. This year, the program has attracted students from Washington State University, Cornell University, University of Vermont, Southern University and Louisiana State University. These students participated in a diverse number of projects as summarized in the Table.

Student/ Supervisor	University	Project
David Goldbold / K. Alshibli	Louisiana State University	Shear Band Characterization of Granular Materials Using Computed Tomography
Jennifer Aguettant / D. Fratta	Louisiana State University	Simplified Diffraction Inversion of an Inclusion in a 2D Medium
Ba Nguyen / L. Wang	Louisiana State University	X-ray Tomography of Concrete Specimens
Jennifer deHay/ D. Fratta	Louisiana State University	Elastic Wave Propagation in a Two Dimensional Model
Misty Daigle / L. Wang & D. Fratta	Louisiana State University	Ultrasonic Versus X-ray Tomography
Vida Sharafkhani / K. Alshibli	Louisiana State University	Analysis of Void Ratio of Glass Beads Using Computed Tomography
Robert Stacey / C. Willson	University of Vermont	Tomographic Investigation of Non-wetting Phase Entrapment in Porous Media
Amy Grove/ C. Willson	Cornell University	Use of Synchrotron X-ray Fluorescence and Tomography to Study Reactive Barriers
Sarah Hunt/ C. Willson	Wash. St. University	Drainage in Unconsolidated Sand Systems
Sam Boggan / J. Sansalone	Southern University	The Effects of the Solidification and Stabilization of Storm Water Residuals
Nicole Harris / L. Wang	Southern University	Measuring Void Content of Asphalt Cement by X-ray Tomography

To support the continuation of this successful program, Dr. C. Willson and Dr. D. Fratta are requesting the National Science Foundation for support for the next three years. The continuation of this program will help our department in getting national recognition and to attract quality students to our graduate program.

Another one of our civil engineering students, Senior Lindsay Olinde, participated this summer in a NSF-REU program at Washington State University. She worked under the supervision of Dr. Mike Barber. The title of her work is “Primary Productivity Affected by Micronutrients in Alpine, Oligotrophic Lakes in the Sawtooth Valley, Idaho”. Her work involved conducting field work and assisting with modeling which deals with nutrient issues for the endangered sockeye salmons. A copy of her research project is posted next to room 3225 in the CEBA Building.

NSF also supports other undergraduate research efforts at LSU. Two REU supplement to the NSF Project headed by Dr. M. T. Tumay and M. Y. Abu-Farsakh entitled “Inclined Piezocone Penetration Aspects - Theoretical Interpretation and Experiment Verification” have been awarded for the last three years. This supplement has supported several projects under the supervision of Drs. K. Alshibli and D. Fratta. Participating

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 ceseal@lsu.edu, fill out an online form at 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

Mia Riazul was recently promoted to the Director of Environmental Services Department, City of Laredo, Texas. Mia is licensed as professional Engineer and Certified Floodplain Manager (CFM) in the state of Texas.

CIVIL AND ENVIRONMENTAL ENGINEERING DEPARTMENTAL CAMPAIGN

The Department of Civil and Environmental Engineering is continuing a fundraising campaign to enrich and enhance programs in the department. Your donation will enhance the Departmental Enhancement Fund supporting new initiatives so that we may continue to produce top-quality engineers.
Our goal is to build an endowment of $400,000 and an annual $50,000 supplement to support the purchase of new lab equipment, computers and software, support of students, and support of faculty activities at professional meetings and conferences.
Any amount will be greatly appreciated; however, donors giving $200 a year for five or more years or over $1000 initially will receive special recognition in our departmental newsletter and on the Departmental Enhancement Fund plaque displayed in the department. Company matching funds will also be acknowledged. Please consider the CEE department this year in your annual giving.

DONOR INFORMATION:
(please check)

_ $10,000 or more _ $5,000 to $9,999 _ $1,000 to $4,999

_ $500 or more _ $200 to $499 _ Less than $200

I pledge $_____per year for the next _____years to the CEE Departmental Enhancement Fund for a total of $_____.

Please make your checks payable to the "LSU Foundation" and note 'for CEE Enhancement Fund'.

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GRADUATION DATE:_____ DEGREE:_____

EMPLOYER:_____

Please mail donations to: Civil and Environmental Engineering
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You will be contacted by our development coordinator to confirm your pledge and support.

THANK YOU

students include: Melanie Lestelle (now with USACOE in New Orleans), Sergio Aviles (now with LA DOTD), Will Tanner (M.Sc. Student – Dean Fellow), Keith Hoffman (M.Sc. Student – Forte Fellow), Lynne Rousell (M.Sc. – NASA Fellow), and David Godbold (LSU student). Their involvement in research activities is documented in a number of publications, research posters and research reports:

- Alshibli, K. A., Godbold, D., and Hoffman, K. (2003), "The Louisiana plane Strain Apparatus for Soil Testing", *ASTM, Geotechnical Testing Journal, under review.*
- Fratta, D., Rhea, K. B., and Roussel, L. (2002). "CE 3350: Geotechnical Engineering Laboratory – Lab Manual". Department of Civil and Environmental Engineering. Louisiana State University. Baton Rouge, LA.
- Fratta, D., Alshibli, K. A., Tanner, W. M, and Roussel, L. (2004), "Combined TDR and P-wave Velocity Measurements for the Determination of In-Situ Soil Density". *Transportation Research Board* (Submitted for Publication).
- Godbold, D. and Alshibli, K. A. (2002). "Shear Bands in Granular Materials", Poster presentation for the Summer Undergraduate Research Forum (SURF). July 29, 2002. College of Basic Sciences. Louisiana State University. Baton Rouge, LA.
- Lestelle, M. S. and Fratta, D. (2002). "Tomographic Imaging in Civil Engineering: Ultrasonic and Electrical Based Imaging - Tomographic Imaging of a Concrete Specimen Using Ultrasonic Waves". Poster presentation for the Summer Undergraduate Research Forum (SURF). July 29, 2002. College of Basic Sciences. Louisiana State University. Baton Rouge, LA.
- Roussel, L. E. and Fratta, D. (2002). "Tomographic Imaging in Civil Engineering: Ultrasonic and Electrical Based Imaging - Tomographic Imaging Using Electrical Resistivity Measurements". Poster presentation for the Summer Undergraduate Research Forum (SURF). July 29, 2002. College of Basic Sciences. Louisiana State University. Baton Rouge, LA.
- Trautwein, S., Alshibli, K., Fratta, D., and Tanner, W. (2002). "SBIR A01-145: Phase I: Rapid Determination of Field Density and Moisture Content – A Proof of Concept". US Army Small Business Innovative Research (SBIR) Program.

Finally, Dr. Sherif Ishak has also been awarded a NSF/REU Supplement entitled "NSF/USDOT Information and Communication Systems for Surface Transportation (ICSST): Exploring New Traffic Characteristics and Performance Measures Using Feature Extraction and Texture Characterization of Spatiotemporal Traffic Contour Maps". Dr. Ishak indicates that the students will work collaboratively with current graduate students in the area of transportation engineering. Selected students will participate on various basic/applied research activities with the purpose of stimulating their research interest in that field at the graduate level and strengthening their computational and programming skills.

The Department provides these and other opportunities for the undergraduate students to become involved in research and gain valuable hands-on experience. More information about the NSF-supported REU programs at: http://www.nsf.gov/home/crssprgm/reu/

Left, 2003 NSF REU Students posing outside the Germano Center

Alumnus Named President and CEO of Company

Effective March 1, 2003, Robert A. “Bob” Deason was named President and Chief Operating Officer of J. Ray McDermott, S.A. J. Ray McDermott is a subsidiary of McDermott International, Inc, a worldwide energy services company.

Mr. Deason is a civil engineering alumnus of Louisiana State University. With over 30 years of engineering experience, he has served as Executive Vice President of Gulf Interstate Engineering Company and Senior Vice President, Operations at PLT Engineering. Mr. Deason also spent 18 years at Fluor. His positions at Fluor included Vice President, Operations for the Oil and Gas and Chemical strategic business unit, Vice President, Project management for Production, Pipelines and Marine Services and Vice President, Project Management for the Petroleum and Petrochemical operating company.

Levitan Speaks to Congressional Staff

Under the auspices of the Congressional Wind Hazard Reduction Caucus, ASCE and members of the Wind Hazard Reduction Coalition conducted a briefing for Congressional staff on Thursday, June 12th, 2003. Marc Levitan of the LSU Hurricane Center briefed staffers on the Midwest tornadoes of May 2003. Dr. Levitan investigated the destruction with a team from the American Association for Wind Engineering (AAWE), funded by the National Science Foundation. He also provided information on plans for refuges of last resort during last year's Hurricane Lili. Information on the Wind Hazards Reduction Coalition can be found at http://www.windhazards.org

In related news, H.R. 2020, the Hurricane, Tornado and Related Hazards Research Act which would create a federal wind hazards reduction program, has picked up momentum in the House. In addition to lead sponsors Dennis Moore (D-KS) and Mario Diaz-Balart (R-FL), the bill now has 55 co-sponsors.

Marc Levitan (CEE and LSU Hurricane Center), left, and Danny Killcollins of the Florida Division of Emergency Management brief Congressional staff on the effects of recent windstorms in the U.S.

At LSU, Dr. Okeil plans to continue working on finding innovative and efficient ways to use new materials (FRP, SMA) in civil structures. He is also initiating a new effort in the field of non-destructive testing (NDE). NDE is a research trend that has started to gain attention lately. Dr. Okeil also has a longstanding record in teaching. He has developed and taught several structural engineering design and analysis classes and labs. This experience has been acquired at four universities. His teaching abilities were recognized when he received the *“Outstanding Teaching Award”* at NCSU. He also served as consultant and senior engineer to several consulting firms on various projects related to both buildings and bridges. Dr. Okeil is a registered professional engineer (P.E.) in the state of Florida.

Have You Heard ?

Dr. Khalid Alshibli was featured in the *Space Research Magazine* of NASA , June 2003 issue, cover page and page 27. Dr. Alshibli's featured profile as Project Scientist for the NASA funded “Mechanics of Granular Materials Experiment" full article can be viewed at http://spaceresearch.nasa.gov/general_info/spaceresearchnews.html

Dr. Khalid Alshibli has received the 2003 NASA/ Marshall Space Flight Center Group Achievement Award for his contribution to the Mechanics of Granular Materials (MGM) Project. Dr. Alshibli is serving as the Project Scientist for MGM.

Dr. Khalid Alshibli was selected to participate in the First Japan- U.S. Workshop on Testing, Modeling, and Simulation in Geomechanics which was held in Boston June 27-29, 2003. He gave a presentation entitled “Influence of particles’ Surface Roughness on Strength Properties of Particulate materials.

Dr. Steve Cai has recently served as a panelist for the National Science Foundation for proposal review.

Dr. Steve Cai has recently served as session chair for the 11th International Wind Engineering Conference, Lubbock, Texas.

Dr. Emir Macari has been elected as a Member of Mexican Academy of Engineering.

Dr. John Metcalf has been appointed to the Transportation Research Board Technical Committees on Technology Transfer (A5012) and International Activities (A5005).

Dr. John Metcalf was profiled in the September-October 2003 issue of *Transportation Research News*.

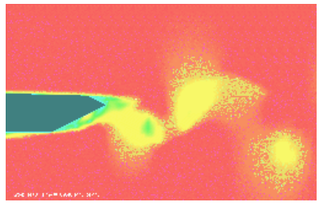
Dr. Vijay P. Singh has been elected as Fellow of Georgian Academy of Science, Republic of Georgia. This is the highest award a scientist can receive in the Republic of Georgia.

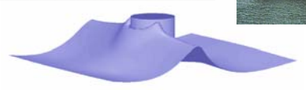
Dr. Vijay P. Singh has been elected as a Member of Russian Academy of Water Management Sciences. This is the highest award for a water resources professional in Russia.

Dr. Vijay P. Singh has also been elected as a Member of Mexican Academy of Engineering.

Continued from Page 7

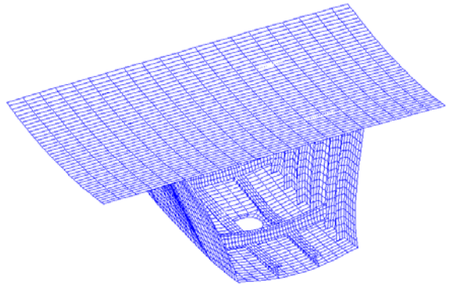
behavior. Due to this fact, the most common vibrations problems on for example Large Civil Engineering Structures (LCES) are those induced by vortex shedding, that is, both wind flow and wave/current loads. Although previous investigations have been done, unresolved issues remain to be investigated of the interactions of density stratified multiphase fluids and fluid-solid mechanisms. This is especially true when the free-surface waves becomes unstable and breaks and for fluid structure mechanisms with high Re. The research of Dr. Frandsen is concerned with these interactions as they could be responsible for loss of structural integrity and even failure. To this end, numerical models can prove to be valuable tools in analyzing and understanding the interaction mechanisms of free surface instabilities, and FSI. Below figure illustrate a typical computational flow image of vortical structures in the near-wake of a long-span bridge, and a snapshot from a simulation of wave interaction with a leg of an offshore platform.





Before joining LSU, Dr. Frandsen had a similar position as a Departmental Lecturer at Oxford University, Department of Engineering Science (U.K.). Prior to this position, she was at Cambridge University Engineering Department (U.K.), where she earned her doctorate. Underpinning her academic career, part of her industrial experience includes conceptual and detailed design of approximately 20 fixed jackets (25-150m deep water) and several semi-submersibles in deep water. The research and practical experience from industry has been integrated into teaching courses. This includes the topics of fluid mechanics, hydraulics, structural dynamics and wind engineering; taught at Oxford University (U.K.) and most recently in structural dynamics at LSU.

The newest addition to the structures group is **Dr. Ayman M. Okeil**. Dr. Okeil comes to us from the University of Central Florida in Orlando, FL, where he worked as a Visiting Assistant Professor. He received his Ph.D. from North Carolina State University where his research led to introducing new design concepts to the nuclear industry based on intensive nonlinear finite element simulations of steel structures under seismic loading. In Florida, Dr. Okeil worked on several projects related to bridge engineering. One of these projects dealt with behavior and design of box girder bridges, especially for girders with access hatches (see figure). The main thrust of his research in recent years is in the field of structural repair using composite materials. He is considered to be the first to introduce LRFD calibration to this area of research. He developed and co-developed several computer codes for the analysis and design of different bridge systems. Code examples include BOXWARP, which calculates warping related parameters for composite box girder bridges. MACS is another unique program for the nonlinear analysis for continuous bridge girders. It can handle construction sequence for different types of girders including, reinforced concrete, prestressed concrete and steel girders in addition to any composite strengthening scheme.



Finite Element mesh of a composite steel box girder bridge

Research Grants and Awards

Drs. **Khalid Alshibli** and **Dante Fratta** have received a new grant from the US Army for a project called Rapid Determination of Field Density and Moisture Content-Phase II. They are teaming with Trautwein Soil Testing Equipment Company in Houston to develop a new device to measure soils field density and moisture content as an alternative for the Nuclear Density Gauge. Phase I of the project was successfully completed in January 2003. The award for Phase II is $586,556 for two years.

Steve Cai, Assistant Professor, **Marc L. Levitan**, Associate Professor, Department of Civil and Environmental Engineering, and Dimitris E. Nikitopoulos, Associate Professor, Department of Mechanical Engineering, have recently received a National Science Foundation grant (NSF):

> C. S. Cai, M. L. Levitan, and D. E. Nikitopoulos "Investigation of large coastal bridge performance in hurricane environment" Project No. CMS-0301696, National Science Foundation, $311,565, 07/01/2003 – 06/30/2006.

Steve Cai, Assistant Professor, and **Richard Avent**, Mr. and Mrs. C.W. Armstrong Jr. Professor of Engineering, Department of Civil and Environmental Engineering, have recently received a grant from Louisiana Department of Transportation and Development (LaDOTD):

> C. S. Cai and R. Avent "Assessing the needs for intermediate diaphragms in prestressed concrete bridges", Project No. 03-3ST, LaDOTD, 06/01/2003-05/31/2005, $199,613.00.

Steve Cai, Assistant Professor, Department of Civil and Environmental Engineering, has recently received a grant from FHWA through Kansas Department of Transportation (KDOT):

> C. S. Cai "Load Distribution and Performance of Fiber-Reinforced Composite Honeycomb Deck for Bridges" Kansas DOT/FHWA-IBRC Program, $53,474.00, 01/01/2003-12/31/2004.

Happy Holidays!

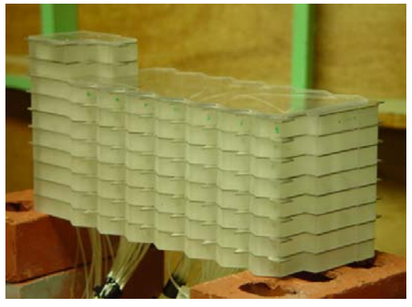
The Department of Civil & Environmental Engineering wishes you and your family the best this holiday season.

STRUCTURES

ACADEMIC/RESEARCH GROUP

Dr. R. Richard Avent, C. W. Armstrong Distinguished Professor, has had a consistently funded research program over the years from state, federal and private sources. He has published over 100 technical articles on his research. The early thrust of Dr. Avent's research was related to the analysis and design of long span structural systems. He contributed to the development of and utilized the techniques of discrete field mechanics to develop analysis procedures for stiffened plates and shells, cable networks, and planar and space truss systems. This work led into the area of structural stability with both analytical and experimental research related to column and truss stability. In the mid 70's, Dr. Avent initiated research on repair and rehabilitation of structures. Recognizing that structural repairs have often lacked a rational analysis and design basis, he began to provide this basis through analytical and experimental research. His innovative development and quantification of epoxy repair methods for timber structures has received national recognition and is included in ASCE's manual on Repair and Upgrading of Timber Structures and the Wood Engineering and Construction Handbook published by McGraw Hill. ASCE recognized Dr. Avent's development of the epoxy repair method for timber structures by presenting him the 1995 Innovation in Civil Engineering Award. This work with epoxies was also extended to the repair of concrete structures. As the national awareness of America's aging infrastructure grew, so did Dr. Avent's research. Major research projects on the repair of bridges have been conducted. Of particular significance is his work on the use of heat straightening to repair damaged steel structures. His research in this area led to him being the recipient of the 1991 Arthur Wellington Prize awarded by ASCE and the incorporation of heat straightening as standard repair procedure. The problems of underwater damage to bridge structures have led Dr. Avent into research in this vital area. He has received training as a commercial diver and has supervised and conducted over 2000 underwater bridge inspections. As a result of such inspections, he has designed innovative repairs for critically damaged girders. The database of 2000 bridges has led to studies on types and rates of underwater bridge damage for various materials. He also wrote the chapter of Underwater Bridge Inspections for FHWA Bridge Inspections Training Manual 90.

Dr. Marc L. Levitan, Director, LSU Hurricane Center, and Charles P. Siess, Jr. Associate Professor, has been actively engaged in wind engineering research, practice, and teaching for many years. His research focuses on wind loading on structures, wind damage assessment and mitigation, and hurricane sheltering/evacuation issues. Current projects include studies of wind loads on industrial structures, assessment and design of hurricane shelters, vulnerability of petrochemical facilities to hurricanes, and engineering applications of remote sensing. Dr. Levitan led the creation of the LSU Hurricane Center and serves as its founding Director. The Center is a campus-wide, multi-disciplinary initiative addressing hurricanes and other hazards and their impacts on the natural, built, and human environments.



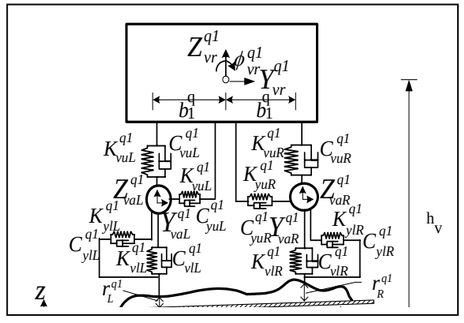
Wind Tunnel Model of 8-Story Hospital Building Used as a Hurricane Shelter

Dr. Levitan and colleague Dr. Nikitopoulos (Mech. Eng.) have built a modern Wind Tunnel Laboratory, supporting research and instruction in wind engineering and fluid-structure interaction. It's well-equipped with instrumentation and boasts one boundary layer and three aerodynamic wind tunnels. The facility has helped attract research funding from NSF, NASA, and FEMA. It also played a role in recruitment of faculty members Cai, Frandsen, and Visiting Professor Holmes, all of whom have expertise in wind engineering. The Lab continues to expand its capabilities with a missile cannon (under construction) that will be used to test impact resistance to windborne debris.

Dr. Levitan is very active in the profession, consulting for wind load analysis on complex structures, wind resistance of existing buildings, and wind-damage investigations. He's involved in development of codes and standards and serves on many ASCE national technical committees, including the ASCE 7 Wind Loads subcommittee. Dr. Levitan chairs the ICC committee developing a National Standard for Design of Storm Shelters. He is President–Elect of the American Association for Wind Engineering and will chair the 10^{th} Americas Conference on Wind Engineering (Baton Rouge, June 2005). Prior to joining LSU, Dr. Levitan was the Managing Director of the Wind Engineering Research Field Laboratory at Texas Tech University, a state-of-the-art facility for measuring wind loads on low-rise buildings and structures.

The academic pursuits of Dr. Levitan are engineering for natural hazards, structural analysis, and design of steel structures. He has received several teaching awards from ASCE, Chi Epsilon, and the Civil and Environmental Engineering Departments at both LSU and Texas Tech University.

Dr. Steve C. S. Cai's current major research is in bridge performance and bridge dynamics, with collaborations with Drs. Levitan, Voyiadjis, Avent, Zhang (LTRC), Alayway (LTRC), Peterman (KSU), Gu (Tongji Univ.) and Nie (Tsinghua Univ., China). (a) Supported by the NSF, Dr. Cai is developing methodologies in predicting long-span bridge performance under strong wind, considering the interaction of wind, bridge and traffic; (b)Supported by the NCHRP-IDEA Program, he is developing more efficient approach for mitigation of cable vibrations using new materials; (c) Supported by FHWA Innovative Bridge Research and Construction Program, he is developing Fiber Reinforced Polymer sandwich panels for bridge applications and also investigating monitoring and nondestructive evaluation methods for FRP and other bridges; and (d)Supported by LaDOTD, Dr. Cai is investigating the performance of prestressed concrete bridges and the interaction of bridge approach span with embankment. Dr. Cai is a professional engineer and got his Ph.D. from University of Maryland in 1993. Before joining LSU, Dr. Cai worked for Michael Baker Inc., Florida Department of transportation, and Kansas State University.



Truck Model for Bridge-Traffic-Wind Interaction

FRP Sandwich Panel

Dr. Jannette Frandsen's research program involves experimental and computational modeling of moving boundaries with a focus on advancing research and education in water waves and fluid-structure interactions (FSI). In particular, the aim is to advance computational modeling of free surface waves and high Reynolds number (Re) flows because model-scale tests used in today's design cannot reproduce full-scale structural

Continued on Page 8