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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.

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# Louisiana State University



## CIVIL AND ENVIRONMENTAL ENGINEERING

Volume 4 Fall Issue

November 2004

### Message from the Chairman

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



This semester we welcome two new inductees to the Civil and Environmental Engineering Hall of Distinction for 2004 – they are Kam K. Movassaghi and George A. Munfakh. Both Movassaghi and Munfakh are currently active as President and Senior Vice President respectively of two important Engineering firms in the community. Dr. Movassaghi was appointed in 1998 as Secretary of the Louisiana Department of Transportation and Development. Dr. Munfakh is considered a worldwide recognized expert in ground improvement and has given many keynote conference speeches on this subject. Both inductees obtained their Ph.D. degrees in Civil Engineering from LSU.

This semester also sees the retirement of Dr. Mehmet Tumay after many years of service to the Department. Dr. Tumay joined the Department in 1976 and has since been active in in Geotechnical Engineering. He also served as the Director of Research at the Louisiana Transportation Research Center and as the Associate Dean for Research and Graduate Studies at the LSU College of Engineering.

We also note that several of our faculty members have received this semester a competitive NSF grant. In particular, Drs. Tumay, Wang and Mohammad received an NSF grant to develop and implement a digital specimen and digital tester technique for infrastructure materials.

This academic semester is coming soon to its end and the final exams will be arriving soon along with the holidays. I would like to take this opportunity to wish you all happy finals and happy holidays.

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# Hall of Distinction

2004



**The Department welcomes two new inductees to the Civil and Environmental Engineering Hall of Distinction for 2004:**

## KAM K. MOVASSAGHI



Dr. Kam K. Movassaghi is currently President and CEO of Movassaghi Group, PEC, in Baton Rouge, Louisiana. He has experience in civil engineering in the areas of consulting, academia, and government. Dr. Movassaghi received his Bachelor of Science degree from the University of Louisiana, Lafayette in 1963. He then went on to earn his Master of Science and his Ph.D. from Louisiana State University's CEE Department in 1965 and 1971, respectively.

Dr. Movassaghi served as an engineer in several engineering firms in his early career. He then joined the faculty at the University of Louisiana, Lafayette (formerly Southwestern Louisiana in Lafayette). He was then selected as head of the Department of Civil Engineering. Under his direction the department expanded programs in research, developed a design computation laboratory, developed a graduate engineering management program, and received very successful ABET accreditation reviews.

In 1998 Dr. Movassaghi was appointed by then Governor M.J. "Mike" Foster as Secretary of the Louisiana Department of Transportation and Development. With this position, Dr. Movassaghi was able to increase the annual construction project lettings by 78 percent with no net increase in annual revenues. He also implemented a comprehensive management plan to expedite completion of the TIMED program, the largest construction program in the history of the department. Dr. Movassaghi accomplished these and many

# 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 [kklein6@lsu.edu](mailto:kklein6@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: \_\_\_\_\_

\_\_\_\_\_

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# 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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FAX NUMBER: \_\_\_\_\_ E-MAIL: \_\_\_\_\_

GRADUATION DATE: \_\_\_\_\_ DEGREE: \_\_\_\_\_

EMPLOYER: \_\_\_\_\_

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You will be contacted by our development coordinator to confirm your pledge and support.

**THANK YOU**

among other notable feats in the 6 years as he served the state in this role.

Some of Dr. Movassaghi's awards and honors include the President Award of Merit, Louisiana Engineering Society (2004); Highway Safety Award, Louisiana Highway Safety Commission (2004); National Government Engineer of the Year, American Society of Civil Engineers (2002); Engineering Faculty Professionalism Award, Louisiana Engineering Society (1997); and Outstanding Civil Engineer of the Year, Louisiana Section of American Society of Civil Engineers (1995). He is also a member of American Society of Civil Engineers, Louisiana Engineering Society, Phi Kappa Phi, Chi Epsilon, and Sigma Xi. Dr. Movassaghi is a registered Professional Engineer and a Professional Land Surveyor in the state of Louisiana.

In addition to his many contributions to the engineering community, he has given to his local community through various avenues of community service Dr. Movassaghi is a loving husband and father of two children.

## GEORGE A. MUNFAKH



Dr. George A. Munfakh presently serves as Senior Vice President of Parsons, Brinckerhoff, Quade & Douglas engineering firm at which he is in charge of the Geotechnical and Tunneling Division. He is considered one of the leading innovators in the field of geotechnical engineering. Dr. Munfakh received his Bachelor of Science degree in civil engineering from the University of Aleppo, Syria, in 1967. He received both his Master of Science and his Ph.D. from Louisiana State University in 1970 and 1973, respectively.

Dr. Munfakh has 30 years of experience with Parsons, Brinckerhoff, Quade, & Douglas. As the manager of the Geotechnical and Tunneling Division, 96 staff in eighteen offices report to Dr. Munfakh. His project experience includes underground facilities, marine facilities, and surface facilities. Dr. Munfakh is considered a worldwide recognized expert in ground improvement and has given many keynote conference speeches on the subject.

Some of Dr. Munfakh's professional affiliations include the International Society of Soil Mechanics and Geotechnical Engineering, American Society of Civil Engineers, Chi Epsilon, and Phi Kappa Phi. He was also the past chairman of the Met Section Geotechnical Division. Some of the awards and honors that Dr. Munfakh has received are the American Road & Transportation Builders Association's Globe Award for Environmental Excellence (2002), presenting the prestigious ASCE Martin S. Kapp Lecture (1999), Parsons Brinckerhoff Professional Publication Award for the technical paper entitled, "Ground Improvement Engineering – The State of the Practice" (1996) and the Michael Claus Memorial Award for Excellence in Engineering Research from LSU (1973). Dr. Munfakh has professional registration in Syria.

Dr. Munfakh has published over 35 works during his career. He is a highly respected engineer who has continued to share his expertise with the profession through papers, lectures, and seminars.

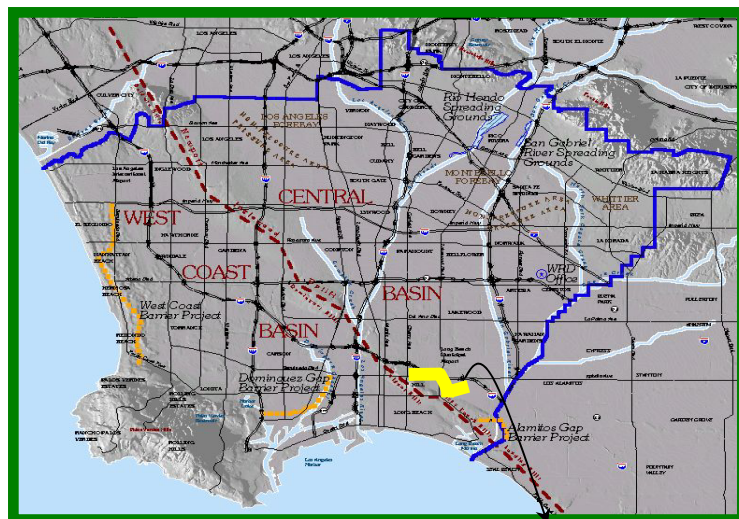
# Dr. Frank Tsai Studies Saltwater Intrusion Problem

Dr. Frank Tsai is working on the saltwater intrusion problem in the coastal aquifer. The simulation of saltwater movement in aquifers is challenging in that the heavier saltwater density changes the fresh groundwater flow behavior. Another challenge arises from limited information on aquifer heterogeneity which is characterized by geology, hydrogeology, lithology, sedimentology, etc. Data insufficiency causes major model structure error and modeling uncertainty.

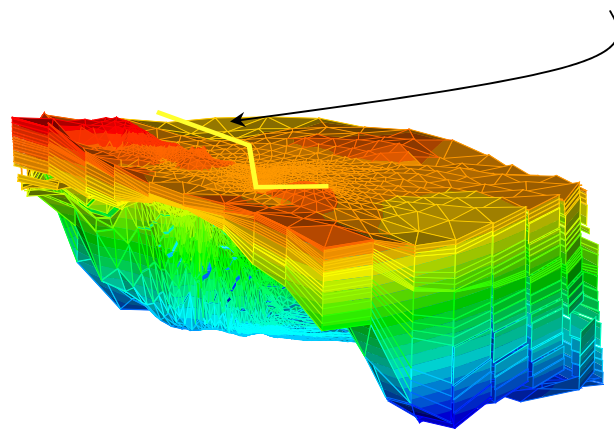
To better modeling, Dr. Tsai mainly focuses on the exploration of new inverse theory that engages generalized parameterization, geostatistics, and Bayesian Model Averaging to cope with stochastic aquifer heterogeneity estimation and the multi-model multi-structure problem. In the meantime, Dr. Tsai is developing a saltwater intrusion simulation model to validate the inverse theory and to facilitate the saltwater intrusion remediation and management studies.

Dr. Tsai has been working on the saltwater intrusion barrier management in Southern California Coastal Plains and collaborating with UCLA and Los Angeles County Public Works to develop a three-dimensional aquifer system which contains 5 aquifers and 4 aquicludes (shown in the figure). The overriding goal aims at developing cost-effective recharge strategies at the recharge wells to effectively and efficiently prevent saltwater from crossing the designated barrier alignment. Presently, Dr. Tsai is initiating a pilot study on the saltwater encroachment simulation and management at the East Baton Rouge Parish, Louisiana to sustain the long-term groundwater resource within the Capital area.

Southern California Coastal Plains



Alamitos Saltwater Intrusion Barrier



Have You Heard ?

**Dr. Steve C. S. Cai** has been appointed as Secretary/Treasurer by the Board of Directors, American Association for Wind Engineering (AAWE) for a 2.5 year term, starting with July 1, 2004. While AAWE consists of members mainly from the United States and Canada, some members are from Japan, Europe, and other areas in the world.

**Mr. Robert J. Dorgan** was awarded first prize in the Student Paper Competition at the 41st Annual Meeting of the Society of Engineering Science hosted by the University of Nebraska-Lincoln.

**Dr. John B. Metcalf** was invited to address a meeting of the European 'Cooperation in Science and Technology' (COST) project group 347 on accelerated pavement testing in June.

**Dr. Vijay Singh** has been honored with the Distinguished Professor Award by Mexican Academy of Science.

**Dr. George Z. Voyiadjis** was elected to the Board of Directors of the Society of Engineering Science, January 2004 – December 2006.

**Dr. George Z. Voyiadjis** was elected Vice Chair of the Committee on Constitutive Equations of the ASME Joint Applied Mechanics and Materials Divisions, 2004-2005.

**Dr. George Z. Voyiadjis** was elected Vice Chair on the Committee on Inelastic Behavior of the ASCE Engineering Mechanics Division, 2004-2005.

Continued from Page 7

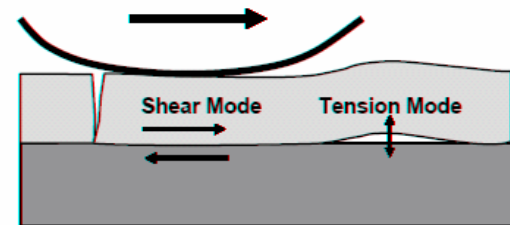
currently an Associate Editor (Assessment Technologies) of the ASCE Journal of Infrastructure Systems, and has been on the Editorial Board of the Journal of the Geotechnical Engineering Division of the American Society of Civil Engineers, 1984-1994. He is a member of the Advisory Council of the Electronic Journal of Geotechnical Engineering (World Wide Web of Geotechnical Engineers). He has been active in ASCE Committees on Publications, and Placement and Improvement of Soils, and Safety and Reliability.

Dr. Tumay served as a charter member of the Academic Research Council (ARC) of the Civil Engineering Research Foundation (CERF) 1995-2002, and represented LTRC on the National Council for Civil Engineering Research (NCCER) of CERF. He was selected as Louisiana State University's recipient of the Louisiana Engineering Foundation Faculty Professionalism Award for 2001. His scholarly activities include more than 125 published scientific articles, and contributions to numerous conferences and symposia. He has presented invited papers worldwide on technical topics and general research, education and policy issues in geotechnical engineering.

Over the years, Dr. Tumay has made many contributions to LSU and the Department. We wish him success and long life in his retirement.

## NCHRP Funds Project

National Cooperative Highway Research Program (NCHRP) funds \$350,000 for a project titled Optimization of Tack Coat for HMA Placement to determine the optimum application methods, equipment type and calibration procedures, application rates, and asphalt binder materials for the various uses of tack coats and to recommend revisions to relevant AASHTO methods and practices related to tack coats. The Principal Investigator for this project is Dr. Louay Mohammad, Associate professor of CEE and Director of the Engineering Materials Characterization Research Facility at LTRC. The Co-Principal Investigator is Joe Button, head of the Materials & Pavements Division of the Texas Transportation Institute at Texas A&M University. Other faculty participants in the project include assistant professor Linbing Wang and Professor Lynn R. LaMotte of LSU Health Sciences Center. Asphalt tack coat is a light application of asphalt, usually asphalt diluted with water. It is used to ensure a bond between the surface being paved and the overlying course. A tack coat provides necessary binding between pavement surface layers to make sure that they act as a monolithic system to withstand the traffic and environmental loads. A strong tack coat binding between the layers of a pavement is critical to transfer radial tensile and shear stresses into the entire pavement structure. On the other hand, no bond or insufficient bond decreases pavement bearing



Distress modes at pavement interface under service conditions

capacity and may cause slippage. Insufficient bonding may also cause tensile stresses to be concentrated at the bottom of the wearing course. Such concentrated stress may accelerate fatigue cracking and lead to total pavement failure. Few guidelines are available for proper selection of tack coat material type, application rate, and placement. Optimum tack coat type and application rate will be determined by the type and condition of the existing pavement surface as well as other factors including material type and permeability of the HMA pavement overlay to be placed, the traffic loading, and the climate. Proper, uniform tack coat application requires close attention to equipment calibration and operating parameters.

## Faculty Receive Competitive NSF Grant

Several CEE faculty members have received a very competitive national award from the National Science Foundation's Partnership for Innovation Program. NSF has awarded a three year \$599,783 grant for support of the project entitled "Development and Implementation of Digital Specimen and Digital Tester Technique for Infrastructure Materials." This project, under the direction of **Drs. Mehmet T. Tumay, Linbing Wang, and Louay N. Mohammad**, will create a computer-based testing and evaluation system for construction materials. The grant was awarded October 15, 2004 and can be continued for 3 years. For the first year of work, the professors have received \$234,619. Of the 222 proposals submitted to NSF for this program, only 15 were selected for funding.

## Digital Specimens & Digital Tests

The digital representation of the real 3D microstructure of a physical specimen is a **Digital Specimen**. It is the digital counterpart of the physical specimen in every required detail. Computational simulation of a mechanical or physical test, which is based on digital specimens and considers every required detail of the microstructure and its evolution, is a **Digital Test**. Figure 1a presents one digital specimen. It is a stack of 81 slices of a physical specimen non-destructively acquired. The required details at particle level for mechanical modeling are available from the digital specimen. Figure 1b is a visualization of the void structure of the digital specimen presented in Figure 1a. It is also a digital specimen if the study is on the permeability and moisture damage of the asphalt mix. Figure 1c presents a simulation of triaxial compression test (digital test) on the digital specimen while Figure 1d presents a simulation of indirect tensile test (digital test) on the same specimen. Digital specimen and digital test are generally multiple functional. Currently, the major technique for the reconstruction of digital specimens is X-ray Computerized Tomography. Computational simulation could use Finite Element Method, Discrete Element Method and Boundary Element Method.

The project will be supported by the Quantitative Imaging and Computational Simulation (QICS) Laboratory established by Dr. Linbing Wang and his colleagues and the partners' laboratories. The QICS laboratory is equipped with a) a high resolution x-ray computerized tomography imaging system, b) an optical imaging system, c) an infrared imaging system, d) a high speed imaging system up to 2 million frames per second, e) several SGI and PC workstations, and f) computer software including Image Pro Plus, VoxBlast, IDL, FEM program ABAQUS, and DEM program PFC<sup>3D</sup>. The QICS laboratory supports research funded by NSF, FHWA, DoD, DoA, LTRC, and Louisiana Board of Regents. It also supports investigative research of common interest at request.

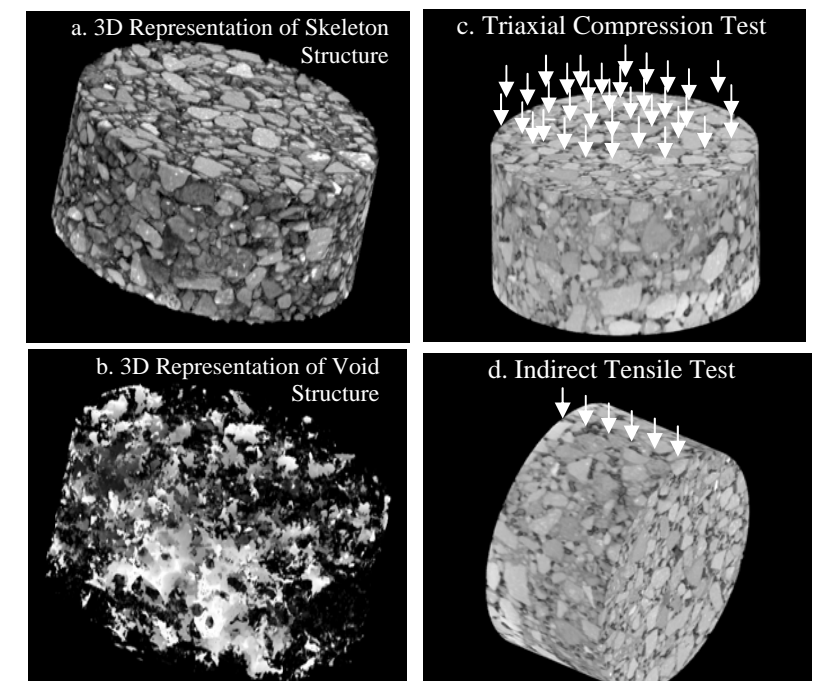
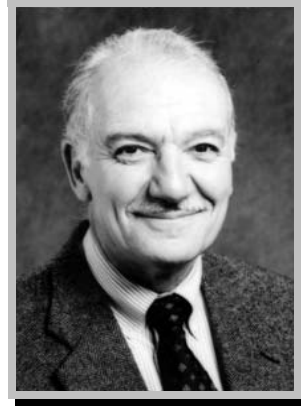


Illustration of the Concepts of Digital Specimen and Digital Test

# Dr. Mehmet Tumay Retires



This year, Dr. Mehmet T. Tumay, Fellow and a Life Member of the American Society of Civil Engineers, will retire after over 25 years of service to the Department. Dr. Tumay is the Georgia Gulf Distinguished Professor in the Department and has served the LSU College of Engineering as the Associate Dean for Research and Graduate Studies, and as Director of the Donald W. Clayton Interdisciplinary Graduate Program in Engineering Science, May 1997 – July 2004. Dr. Tumay received his B.S., M.S., and Ph.D. from Robert College School of Engineering, University of Virginia, and Istanbul Technical University, respectively. He also holds a postdoctoral Docent degree from Istanbul Technical University. His academic, research and consulting affiliations include universities, research institutions, and industry in the U.S., The Netherlands, France, Turkey, Norway, Taiwan, Poland, Brazil and People's Republic of China.

Dr. Tumay's major field of interest is geotechnical engineering. He has done extensive research for the past 35 years in the areas of in-situ evaluation of engineering properties of soils, soil physico-chemical behavior, and novel methods of soil improvement. He has earned national and international recognition from the consulting and academic communities for his pioneering research accomplishments, mainly in electronic cone penetration and computer-aided data collection/reduction systems for evaluation of the engineering behavior of particulate media.

Dr. Tumay has served as Project Director / Principal Investigator of numerous grants from prestigious national and international agencies, including the U.S. National Science Foundation, the office of Naval Research, the Federal Highway Administration, the National Cooperative Highway Research Program, the French Ministry of Research, and the United Nations Development Program. A major international consulting company from the Netherlands established the Fugro post-doctoral fellowship at LSU dedicated to the advancement of in-situ testing under Dr. Tumay's supervision.

The research, scholarly activities, and leadership of Dr. Tumay have played a key role in the progress made by the LSU geotechnical group, in the Department of Civil & Environmental Engineering. The funding for the research and educational program of the seven-member geotechnical faculty has increased to more than \$5,000,000 under Dr. Tumay's coordination during 1980-1990 focusing on in-situ testing, geo environmental engineering, ground improvement and marine geotechnics.

During 1990-1994 Dr. Tumay served as the Director of the Geomechanical, Geotechnical & Geo-Environmental Systems (G3S) program at the National Science Foundation, Washington, D.C., on an Intergovernmental Professional Act (IPA) assignment. During his tenure the budgetary and technical scope of the G3S program he directed was enhanced by 30% to approximately \$3,000,000 annually through active involvement and collaboration with other government agencies such as FHWA, EPA, DOE, AFOSR, intra-NSF programs and industry. Inter- and multi-disciplinary research areas of infrastructure development, environmental geotechnology, underground space development, and high performance geomedia materials and systems were expanded. Multi-national technology transfer and international research efforts were encouraged through Workshops held in France, Canada, Turkey, P.R. of China, Brazil, Scandinavia, and Taiwan to enhance bi-lateral scholarly collaboration.

In March 1994, Dr. Tumay was appointed as the Director of Research at Louisiana Transportation Research Center (LTRC) to initiate/broaden technology development and implementation concepts, and expand the nationally competitive cross-disciplinary funding base from external sources. LTRC is sponsored jointly by Louisiana State University (LSU) and the Louisiana Department of Transportation and Development (LDOTD), and is primarily funded by State funds. During Dr. Tumay's tenure as Director of Research March 1994 - May 1997, LTRC has been awarded research grants and contracts from National Science Foundation, National Cooperative Highway Research Program, Federal Highway Administration, Priority Technologies Program, U.S.C.E. Waterways Experiment Station, and private industry. As a result of this effort, the external research-funding base has grown from zero to in excess of \$2,000,000. This constituted approximately 25% of the LTRC research and development budget. As Associate Dean for Research, and a member of the LTRC Policy Committee, Dr. Tumay continued to participate in the planning and development of LTRC's research expansion project.

Dr. Tumay has done extensive design and consulting for state, private, national and international agencies. In addition, he has successfully conducted special workshops, programs, and seminars at universities, agencies and industrial institutions worldwide. He has served as Maitre de Conference en Mechanique des Sols, Ecole Nationale des Ponts et Chaussees, Paris, France, and as an Advisory Professor to Tongji University, Shanghai, P.R. China, and Federal University of Vicosa, Minas Gerais, Brazil. He participates actively in various professional organizations, including American Society of Civil Engineers (ASCE), National Research Council (NRC), Transportation Research Board (TRB), National Cooperative Highway Research Program (NCHRP), U.S. Universities' Council on Geotechnical Engineering Research (USUCGER), American Society for Testing and Materials (ASTM), the International Society of Soil Mechanics and Geotechnical Engineering (ISSMGE), Accreditation Board for Engineering and Technology (ABET), and American Society of Engineering Education (ASEE).

He is a member of many national and international technical committees, and was Chairman of NRC/TRB Section A2L00 (New AFP00) "Geology and Properties of Earth Materials," 1996-2002, overseeing 6 technical committees, A2L01-A2L06 (New AFP20 – AFP60), and was on the NRC/TRB Group A2000 (NewAFP00) Council on "Design and Construction of Transportation Facilities, and served as Chairman of the "Scope, Organization and Function Committee, 1999-2002. He was Chairman of TRB Committee A2L02 (New AFP30) - Soil and Rock Properties 1989-1995. In 2003, Dr. Tumay was elevated to Member Emeritus status of Committee A2L02 (New AFP30).

In 1994 he was elected to the Board of Directors of U.S. Universities' Council on Geotechnical Engineering Research, USUCGER, and served as treasurer 1994-1996, and as the president 1997 - 1999. Dr. Tumay is

*Continued on Page 8*