

CHRISTOPHER LOUIS MULLEN, Ph.D., P.E.

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SUMMARY

Associate professor with tenure with over 20 years teaching, research, and consulting experience in the doctoral degree granting flag ship university for the state of Mississippi. Registered professional engineer with over 10 years full time practical experience in prominent U. S. structural engineering consulting firms and research organizations. Specialties in 3D computational simulations and field vibration measurements for seismic, fatigue, tornado and blast damage assessments with applications to multihazard mitigation planning, design, retrofit, and monitoring of buildings, bridges, and offshore structures. Recent experience in FE based SSI analysis of highway bridge damage detection and seismic vulnerability to scour, hydro-geomechanical FE simulation of induced seismicity, stability sensitivity of steel building frames to hazard-independent damage, extreme loading of SIP building subsystems, blast-induced building column damage and progressive collapse, GIS based community asset risk and vulnerability assessments, and tests for blast and fire protection of critical infrastructure. Consultant in EOC during Hurricane Katrina and state delegate on Mitigation Assessment Team.

EDUCATION

PRINCETON UNIVERSITY, Princeton, New Jersey

Ph. D. in Civil Engineering and Operations Research, June 1996

Dissertation: *Seismic Fragility of an Existing Conventional Reinforced-Concrete Highway Bridge*

Advisor: *Ahmed Cakmak; Committee: Jean-Herve Prevost, George Deodatis, and Mustava Erdik (Bozazici University)*

M. A. in Civil Engineering and Operations Research, June 1993

RICE UNIVERSITY, Houston, Texas

M. S. in Civil Engineering, May 1981

Thesis: *A Comparison of Fatigue Life Improvements Obtained by Weld Reinforcement and Toe Grinding*

Advisor: *John Merwin; Committee: Loren Lutes, Hardy Borland, and Nick Zettlemoyer (Exxon Production Research Co.)*

B. S. in Civil Engineering, May 1978

ACADEMIC RESEARCH EXPERIENCE

UNIVERSITY OF MISSISSIPPI, Oxford, Mississippi, 1996-Present

Associate Professor of Civil Engineering responsible for nonlinear dynamic 3D computational simulations for seismic vulnerability evaluation of reinforced concrete, prestressed concrete, steel, and masonry structures as well as HAZUS-MH simulations for regional seismic risk assessment

- **USDOE/LBNL Evaluating Induced Seismicity from Injection Wells-Phases I/II (3 yr, \$81,000)** PI responsible for managing doctoral research in conjunction with the Lawrence Berkeley National Laboratory, Earth Sciences Division, Geophysics Department (2014-2016)
- **USDOT/NCITEC (3 yr, \$360,000)** PI or co-PI responsible for three related projects investigating FE based damage detection, SHM, and integrity evaluation of deteriorating highway bridges in north, MS, including effects of structural stiffness degradation and foundation scour. Modeled multiple existing highway bridges under modal vibration and nonlinear dynamic earthquake response using ABAQUS including soil-pile-structure interaction (2012/2013-2016)
- **FEMA Disaster Resistant University Grant/Update (4 yr, \$160,000)** PI or co-PI responsible for leading development an all-natural hazards mitigation plan for The University of Mississippi, Oxford campus. Developed (and updated seven years later) a HAZUS-MH database for over 200 critical, high, medium, and low priority buildings and essential facilities on the campus. Performed vulnerability and risk assessment using HAZUS-MH earthquake simulations of damage and economic loss and adapted ArcMap GIS tool to develop parameters for economic loss estimates for tornado and wind disaster scenarios. Coordinated activities of university advisory committee providing updates on research and presentations at public meetings held to comply with federal guidelines (2005-2006, 2012-2014)
- **DHS/SERRI--Phases I/II/III (3 yr, \$1,600,000)** co-PI responsible for FE based structural component and system response for building structures reinforced with nano protected CMU in-fill walls including multihazard evaluation under blast, earthquake, and fire loading. Coordinated 3-story RC building design to IBC and high-fidelity LSDyna FE

modeling at the US Army ERDC Geotechnical and Structures Laboratory in Vicksburg, MS, as well as PFEM simulation at the NIST Fire Research Laboratory in Gaithersburg, MD (2007-2010)

- **IRIS/NSF NSN Seismic Station Grant (1 yr, \$30,000)** PI responsible for managing construction of a seismic station in Mississippi. Selected contractor in competitive bid process, coordinated plans with the USGS representative for the ANSS network in the southeast US, and monitored installation of the 10 ft high fiberglass vault enclosure and reinforced concrete foundation (2006)
- **MEMA Hazard Mitigation Grant (2 yr, \$180,000)** PI responsible for developing seismic component of a DMA2000 standard mitigation plan for the state of Mississippi. Supervised two graduate and three undergraduate students in performance of a vulnerability and risk analysis for all 82 counties and 8 planning districts in the state based on Level 1 HAZUS-MH earthquake simulations. Physical damage and socio-economic losses to general building stock, essential facilities, transportation lifelines, and utilities were estimated for four different scenario events of varying magnitude. Supervised a field survey of over 150 fire stations, police stations, hospitals, and schools and all highway bridges on major transportation routes enabling performance of Level 2 HAZUS-MH simulations for all counties in the three most seismically vulnerable planning districts in north MS. Incorporated survey results in an interactive GIS display of photographs for use in emergency response and disaster planning as well as an update of the state standard mitigation plan.
- **NASA EPSCoR Research Initiation Grant (1 yr, \$10,000)** PI responsible for developing a Rapid Simulation and Synthesis Tool for airframe composite structures. Supervised one graduate student in developing nonlinear and dynamic finite element simulation/modal analysis software written in the **MATLAB** computational and Graphical User Interface developer environment. The software enables an interface to be developed between modal vibration measurements and finite element model updating.
- **MDOT Research Grant (2 yr, \$70,000)** PI responsible for Supervised three graduate students in a project. **PATRAN/ABAQUS** finite element models up to 40,000 degrees-of-freedom were constructed for a 350 ft long, 3-span, 9-lane, RC interstate highway bridge serving the greater Memphis area. Nonlinear static, linear response spectrum, and nonlinear dynamic time history analyses were performed for simulated pushover and M=6, 7, and 8 seismic events. Key damage states in the 3D beam-column moment-curvature relations form the basis of the performance-based seismic evaluation. Ambient vibration measurements were performed using a 4-channel portable accelerometer array and laptop-based signal analyzer, confirming to high precision the predicted low strain eigenvalue characteristics of the soil-foundation-superstructure system model at fundamental longitudinal and transverse/rotational modes
- **MEMA Hazard Mitigation Project (4 yr, \$400,000)** co-PI responsible for supervising four graduate students in development of 3D finite element models and performance of computationally intensive earthquake response simulations for select buildings and critical facilities on the campus of The University of Mississippi. Wrote structural analysis and vulnerability assessment portion of a 258-page final report to the sponsor. FE models having up to 70,000 degrees-of-freedom were constructed and nonlinear implicit dynamic time history seismic analyses were performed for M6, M7, and M8 events to evaluate the following existing structures on the Ole Miss campus:
 - 1) twin 11-story RC dormitory buildings including subsurface soil to a depth of 150 ft
 - 2) L-shaped 10-story RC dormitory building including subsurface soil to a depth of 150 ft
 - 3) 3-story pre-stressed concrete student union building
 - 4) 5000-seat basketball RC circular coliseum with steel space-frame roof
 - 5) historic 150-year-old un-reinforced brick masonry administration building
(including original and proposed retrofitted conditions)
 - 6) 60-year-old, four-lane, three-span RC highway bridge with steel girder composite deck
 - 7) 250,000 gallon welded steel inverted pendulum water tower
 - 8) two 46-kVolt transformers for central electrical substation
- **CUSEC Research Project (1 yr, \$20,000)** Faculty responsible for supervising two graduate students and wrote a 98-page final report to the sponsor, the Central United States Earthquake Consortium. Finite element models of a **major multi-wing hospital facility** in northern Mississippi demonstrated that the coupling through the soil produced significant dynamic interaction between events during a moderate seismic event

Founding Director, Center for Community Earthquake Preparedness (2002-2009) responsible for promoting research and outreach programs useful to communities in north Mississippi exposed to the New Madrid fault zone seismic hazard

- **Board of Directors Meetings** By-laws have been approved by an independent advisory board of direction that consists of MEMA and CUSEC executive directors and a geology faculty from the University of Southern Mississippi. A practicing structural engineer in Memphis was added to the board in 2004. The board held its organizational meeting in Oxford in July, 2002, and has met annually with public meetings held at the January 2003 Tri-State Earthquake Conference in Tunica, MS, and the January 2004 CUSEC Tristate Earthquake Conference in Memphis, TN. The last meeting was held on the Ole Miss Oxford campus in June 2005.
- **Web Site and Activities** The center developed a web site, <https://www.engineering.olemiss.edu/research/>, that operated for five years beginning with summer 2004. Posted news of interest to the north Mississippi community and highlights

sponsored Research, Outreach, and Education activities conducted by center investigators and students. M4 earthquakes in Alabama and Mississippi have probably generated the most local interest but recent tsunami and hurricane disasters have also generated inquiries into general disaster preparedness. Posted the first Natural Hazards Mitigation Plan for The University of Mississippi on the CCEP web site in advance of public meetings held to obtain feedback and public approval of the plan.

PRINCETON UNIVERSITY, Princeton, New Jersey 1992-1996

Research Assistant *responsible for seismic fragility analysis of existing reinforced concrete buildings and highway bridges and system identification for the damage assessment of ancient masonry structures.*

- **NCEER/FHWA Sponsored Research Project** Wrote a UNIX-FORTRAN subroutine for 3-D nonlinear dynamic reinforced-concrete column damage element exhibiting time-dependent cracking behavior for implementation in the **DYNFLOW** program. analyzed response of conventional **highway bridge** overpass structures, computed damage indices, and assessed seismic fragility.
- **Hagia Sophia Seismic Response** Estimated empirical transfer functions for the Hagia Sophia church in Istanbul, Turkey, using measured earthquake response records. Identified modal and nonlinear system characteristics for the **brick and stone masonry main-dome** support structure.

ACADEMIC TEACHING EXPERIENCE

UNIVERSITY OF MISSISSIPPI, Oxford, Mississippi, 1996-Present

Innovative Instructor *primary responsibility for teaching the following courses having approximately 10 to 50 undergraduate students and 5 to 15 graduate students, including online Blackboard support with downloadable instructional computer programs, network-based, state-of-the-art commercial software in the classroom, project work incorporating field investigation or literature review, and a hands-on structural dynamics laboratory:*

ENGINEERING SCIENCE

- **Finite Element Analysis I, II**- introduces graduate engineering science students to the finite element method in engineering analysis, covering solution of partial differential equations arising in boundary value problems: I) heat (Laplace) equation and linear elastostatics (*first online offering in the School of Engineering and only offering from Department of Civil Engineering*) and II) elastodynamics and nonlinear material response.
- **Computational Simulation and Applications (Intermediate and Advanced)**- introduces senior civil engineering and graduate engineering science students to analytical and computational tools for simulation of linear elastic static, eigenvalue, inelastic and dynamic response of structural components and systems using commercially available finite element and programming software (*first offering of a simulations focused course for seniors through doctoral*).
- **Analysis and Design of Structures subject to Extreme Loading**- introduces graduate engineering science students to analytical and computational tools for inelastic and dynamic response of structural components and systems to extreme loading environments such as blast, earthquake, hurricane, and tornado (*incorporated methods and findings from sabbatical research performed in collaboration with Columbia University and the US Military Academy*).
- **Disaster Mitigation**- introduces senior and graduate engineering science students to concepts of hazard identification, vulnerability and risk assessment, and mitigation strategies to ensure essential facilities perform adequately during disasters through directed reading (*including reports on Hurricane Katrina and Disaster Resistant University program*) and computational simulation (*using SAP2000*).
- **Finite Element Simulation for Performance Based Engineering**- introduces experienced graduate engineering science students to advanced topics in dynamic response and nonlinear constitutive laws for solids and structures with application to performance based engineering through directed reading (*including chapters in new text published on earthquake engineering and my proposed text on FE simulation*) and computational implementation of algorithms.
- **Introduction to Structural Dynamics and Earthquake Engineering**- introduces senior and first year graduate engineering science students to theory and simulation of structural dynamic response of single and multi-DOF systems and their application to problems in seismic response of buildings and bridges (*first offering of a structures course at The University of Mississippi by distance learning and used newly published text on Earthquake Engineering by Bozorgnia and Bertero*).
- **Solid Mechanics**- introduces engineering science graduate students to nonlinear constitutive laws and their formulation using solid mechanics principles including 1D/3D classical theories and computational methods for elasto-plasticity and visco-elasticity (*required project writing User Material Subroutine for ABAQUS*).
- **Introductory and Intermediate Mechanics**- introduce engineering science majors to rigid body vector mechanics including both statics and dynamics of 2D and 3D bodies.

CIVIL ENGINEERING

- **Advanced Mechanics of Materials**- introduces senior civil engineering and graduate engineering science students to advanced topics in the mechanics of materials including theory of elasticity and failure surfaces in three dimensions, torsion, biaxial bending, beams on elastic foundations, stability of columns, stress concentration, and plates.
- **Bridges of New York**- introduces rising seniors in civil engineering to iconic and modern bridges in the metropolitan New York City area including tours of the Brooklyn Bridge and the Tappan Zee (Mario Cuomo) Bridge, presentations by consulting engineers, and a tour of the structures lab at Columbia University (*first offering of a Study USA course in Civil Engineering*).
- **Pre-stressed Concrete Design**- introduces civil engineering graduate students to advanced topics in the behavior and design of pre-stressed and post-tensioned concrete elements including simulation of nonlinear moment-curvature relations using fiber models (*arranged field trips to highway bridge and hospital parking structure construction projects to see pre-stressed girders and piles and post-tensioned beams and slabs*).
- **Bridge Engineering (Introduction and Advanced)**- introduces civil engineering seniors and graduate students to design of concrete and steel bridge superstructure and substructure systems meeting the LRFD provisions of AASHTO for axial, flexure and shear strength culminating in a group design of a bridge superstructure system consistent with MDOT drawings (*first offering of a bridge engineering course in the School of Engineering*)
- **Civil Engineering Design I, II**- capstone design sequence for senior civil engineering students providing in-depth investigation of building codes and mastery of state-of-the-art professional software (*AutoCAD 2000, ArcGIS, Civil/Land Developer, 3D Studio Max, MS Project, SAP2000, RAM Advance, Prokon*) culminating in innovative design of a major civil structure system
- **Steel Design (formerly Structural Design II)** - elective capstone design course for senior civil engineering students providing in-depth investigation of building code (AISC) provisions and design practice applied to (steel) structural systems (*SAP2000*).
- **Civil Engineering Laboratory II**- introduces senior civil engineering students to piezo-elastic strain, photo-elastic stress, and vibration based nondestructive evaluation techniques applied to structural systems.
- **Structural Dynamics (formerly Structures III)**- introduces civil engineering seniors to advanced topics, primarily dynamic response of SDOF and MDOF systems.
- **Structural Analysis (formerly Structures I, II)**- introduces civil engineering juniors and seniors to: 1) elementary structural analysis topics for statically determinate and indeterminate structures with introduction to code provisions for building and highway bridge loadings, 2) matrix analysis and computational methods for beams, frames, and slabs (*SAP2000*).

Graduate Student Motivator primary responsibility for initiating a focused graduate program in Structural Mechanics and Earthquake Engineering, including acting as major advisor for the following masters and doctoral recipients:

Master of Science in Engineering Science (with Emphasis in Civil Engineering)

2016: Trey Powell
2015: Kimberly Tanner, Amir Irhayyim
2013: Kyle Bethay
2012: Satya Gavirneni (successfully defended thesis)
2011: Yihong Shi
2010: Nitin Pangavane
2009: Charlie Burchfield
2004: Sailaja Kondapalli, Khalid Desai
2003: Tezeswi Tadepalli, Jaisimha Siriguri
2002: Saroj Shrestha
2001: Bernard LeBlanc, Anupa Gopinath
2000: Prabin Tuladhar
1999: Jaginath Gopalakrishnan, Jeremy Rice

Doctor of Philosophy in Engineering Science (with Emphasis in Civil Engineering)

2020: Prabodh Dahal (anticipated)
2016: Md. Mamun Miah
2009: Tezeswi Tadepalli
2001: Ismail M. K. Ismail

Continuing Education Instructor *one of two faculty members contributing to the inaugural one-day seminar sponsored by the School of Engineering organized by Ole Miss Outreach and Continuing Education; the successful event was later repeated; selected by the Central US Earthquake Consortium to deliver one-day training seminars on post-earthquake building safety inspection in 3 of the 8 CUSEC states:*

- Adapted slides from the Applied Technology Council in Redwood, CA, for ATC-20 training seminar to include CCEP research focused on Central US hazard and building construction practice. Provided training to engineers, architects, and emergency managers on: Structural Basics, Geotechnical Failures, Seismic Damage to Steel, Concrete, Masonry, and Wood Structures, Non-structural Hazards, Rapid and Detailed Evaluation Procedures, and HazMat and Field Safety. Seminars were held in Hernando, MS (Dec. 2004), Montgomery, AL (May 2005), and Little Rock, AR (June 2006).
- Presented a two-hour lecture on November, 2002, containing UM course and CCEP research entitled, Earthquake Analysis and Design, introducing practicing engineers to seismic hazard in north Mississippi, basic Standard Building Code provisions for seismic design, and examples of seismic vulnerability analysis of critical buildings and bridges in Lafayette and DeSoto counties. A follow-up lecture entitled, Community Earthquake Preparedness, extended the material to include results of HAZUS loss estimation and ArcGIS representation of the ground motions, essential facility inventory, and seismic vulnerability issues.

Outreach Teaching Consultant *one of five faculty members who developed a new course, **Introduction to Engineering**, initiated in September 2000 into the curriculum of the Oxford High School (the course was been expanded to distance learning in 2005 and has been offered to both Ole Miss freshmen and high schools throughout north MS):*

- Designed three-week module introducing students to structural mechanics and design of simple systems; trained the instructor; inspected three 10 ft long wood bridge structures designed and built by the student teams; recommended improvements to ensure successful support of 500 lb load at midspan.
- For distance learning course, developed new textbook contributions on Project Engineering, Structural Testing, and a Civil Engineering Project involving seismic retrofit design competition with proof testing of balsa models of a 3-story building on a tabletop shaker custom designed and constructed for the course.

Server Administrator *primary responsibility for installing (in December 2000) and maintaining a Windows server and domain of 21 high-performance networked Dell workstations dedicated to instruction in the refurbished Civil Engineering Computer Graphics Laboratory; Established the Civil Engineering Advanced Computational Simulation Laboratory through two competitive intramural grants that enabled purchase of two high-performance SGI Origin servers and three workstations dedicated to research and graduate teaching:*

- Installed server-based state-of-the-art software for structural concrete and steel design (SAP2000, RAM Steel), computer-aided drafting (AutoCAD 2000, Microstation), 3D graphic visualization and animation (3D Studio Max), civil design and land planning (Terramodel, GEOPAK, Civil Design, Land Developer), mathematical programming (MatLab, Developer Studio Fortran, and Mathematica)
- Installed server-based state-of-the-art software for advanced finite element analysis (IDEAS, ANSYS, LS-Dyna) and maintain local student accounts for access to university supercomputing center software (Patran, ABAQUS, Matlab, Mathematica, and Visual Numeric Fortran/IMSL)

PROFESSIONAL REGISTRATION

Registered Professional Engineer- License No. 65813, New York (1989) - inactive status

PROFESSIONAL SOCIETY MEMBERSHIP SERVICE

Member, American Society of Civil Engineers (continuous since 1978)

(served on TCLEE Transportation Subcommittee and as ASCE Mississippi Section Structures Chair)

Member, Engineering Mechanics Institute (currently on Objective Resilience Committee)

Member, Structural Engineering Institute (completed three year service as Chair, Technical Committee on Methods of Analysis; served as Mississippi Local Chapter President when SEI first established)

Past Member, Earthquake Engineering Research Institute / Past Affiliate Member, Seismological Society of America

Past Member, National Institute of Building Sciences (served on Multihazard Mitigation Council)

Past Member, National Society of Professional Engineers

(Vice President, District III, Mississippi Engineering Society, faculty advisor to UM student chapter)

Past Member, Chi Epsilon (served as Ole Miss Student Chapter Faculty Advisor)

Past Member, American Academy of Mechanics
Past Member, American Society of Engineering Educators
Past Member, International Association of Bridge and Structural Engineers
Past Member, American Welding Society

PROFESSIONAL EXPERIENCE

PRIVATE PRACTICE, Oxford, Mississippi 1996-2010

Consulting Engineer *responsible for evaluating structural response of buildings and bridges*

- **DHS Stabilization of Buildings after an IED Attack** - Provide guidance and consultation on the Research Agenda including workshops in Oxford, MS, Vicksburg, MS, and College Station, TX
- **AIR Worldwide Corporation, Hurricane Wind Damage Mitigation Study - Boston, MA** Peer review of probabilistic cost-benefit analysis of various mitigation practices that might be implemented in the state of Mississippi (post-Katrina) to reduce insurance rates
- **Charleston Industries, Inc., Signage Systems Wind Study- Charleston, MS** 3D finite element modeling of extruded HSS aluminum frame systems under hurricane wind pressures to determine controlling limit state failure modes
- **US90 Bridge Pier Demolition- West Pascagoula, MS** 3D nonlinear time history finite element analysis of proposed demolition blast sequence at close quarters between the RC piled bent piers of the old four lane highway bridge carrying U. S. 90 in West Pascagoula, Mississippi, and the partially constructed drilled shaft replacement piers. Analysis shows that the dynamic effects on the massive structure can be mitigated to an acceptable level by suitable protective barriers.
- **Lifestyles Condominiums- Biloxi, MS** Performed independent foundation loads computation for gravity and hurricane wind design of a 4-story wood-frame, multi-unit condominium complex, having a reinforced concrete moment-frame parking garage on first floor.
- **Bridge Collapse Investigations- Wayne County, MS, and Coahoma County, MS** Field investigation, structural analysis, and expert opinion at legal depositions (for defense and prosecution, respectively) for steel truss bridges that collapsed in central Mississippi rivers under weight of heavily loaded trucks or trailers. One case was dismissed due to strength of the 3D FE model simulations I provided in comparison to the defendant. In the other, analysis and testimony helped reduce settlement from \$8 MM to less than \$1 MM.
- **Days Inn Motel- Grenada, MS-** Reviewed design plans and performed field inspection for 3-story steel frame motel structure under construction in Grenada, Mississippi. Identified deficiencies in construction details and performed necessary calculations to demonstrate to client (owner) the benefits of ensuring composite action in floor system comprised of hollow core precast panels.
- **Masonry Wall Damage Investigation- Carrollton, MS** Performed field inspection of severely cracked and bulging brick masonry wall damaged by support settlement. Prepared inspection report documenting damage and proposing retrofit strategies.
- **Residential Design/Investigations- Oxford, MS** Performed reinforced concrete retaining wall designs; field inspections of numerous houses, including foundations, floor and roof systems to ascertain structural integrity and assess damage from wind, soil expansion, rotting, and poor construction practice.

WEIDLINGER ASSOCIATES, New York, New York 1988-1991

Bridge Engineer *responsible for fatigue analysis, finite element modeling, structural steel design, and maintenance inspection for major East River suspension bridge rehabilitation projects*

- **NYDOT / NYC Transit Project** Performed reliability-based fatigue evaluation of **riveted stiffening truss** components in support of rehabilitation designs for **Manhattan Bridge** over the East River. Used **PC-FORTRAN** programs to simulate multiple-track real-time subway train load interactions and to compute stress range histograms based on Rainflow counting of cycles in simulated stress time histories.
- **NYDOT / NYC Transit Project** Estimated in-situ tension force distribution in **main suspension cable strands** in anchorages of the **Bronx-Whitestone Bridge** using ambient vibration measurements and **LARSA** finite element analyses of the modal tension-frequency relationship for the strands. Wrote a LOTUS 1-2-3 spreadsheet to estimate load-displacement curves of corroding strand/eyebars accounting for strain-hardening and fracture of individual steel eyebars.
- **NYDOT / NYC Transit Biennial Inspection** Acted as inspection team leader and performed significant portion of New York State **biennial inspection** of **Williamsburg Bridge** as well as numerous parkway overpasses in Queens.

ADAPCO, Melville, Long Island, New York 1986-1988

Structural Analyst responsible for performing finite element analysis and fatigue evaluations of engine components and assemblies

- **Saturn / John Deere Aerospace Projects** Developed and analyzed large geometric and material nonlinear ANSYS finite element models for the **Saturn automobile engine** and for the **SCORE 580 aircraft rotary engine** including superelement analysis with gap and friction interaction elements.

MOBIL R & D CORP, Dallas, TX / MOBIL OIL E & P CO, INC, Louisiana 1981-1986

Senior Research Engineer responsible for monitoring research contracts in the area of fatigue and fracture mechanics of welded, stiffened offshore tubular joints

- **Offshore Engineering R & D** Provided project support for 3-D stress analysis of a **ring-stiffened tubular joint** for the main leg of a Mobil offshore oil/gas production platform installed in 750 ft of water in the Gulf of Mexico and for a Norwegian joint-industry project on fatigue strength of **grout-reinforced welded tubular joints** for deepwater platforms.
- **Offshore Engineering R & D** Performed 3-D finite element response analysis of an offshore platform in Nigeria with damaged members and a yield-line analysis of a **lifting padeye** used for offshore installation of a large Mobil production/living quarters deck in the Scottish sector of the North Sea.

Project Engineer responsible for structure and foundation design, construction management, and inspection for marine and offshore structure projects.

- **Marine Structure Construction** Designed and managed construction of a Mobil **marine dock** in Morgan City, Louisiana, including a pile-supported fixed crane, a pile-supported reinforced-concrete deck supporting a mobile crane, an anchored steel sheet-pile wall, and a grout-filled tubular steel fender.
- **Offshore Structure Fabrication** Managed welded fabrication and offshore installation of a Mobil **gas production platform** in 40 ft of water in the Gulf of Mexico.

NATIONAL BUREAU OF STANDARDS, Gaithersburg, MD 1978-1979

Senior Research Engineer responsible for preceptorship activities in structures area under supervision of center director

- **Center for Building Technology** Provided project support for four senior staff members. Designed aluminum tripod test rig for in-situ pullout of soil anchors beneath mobile homes; performed FORTRAN computations in support of calibration of ANSI standard for Minimum Design Loads for Buildings and Other Structures; wrote spreadsheets to compute wind strap tie-down loads on mobile homes subject to hurricane wind loads and flood uplift; inspected scaffolds at the US Capitol and Supreme Court buildings; prepared NBS published technical reports on all activities including a classification pre-standard for scaffolds

PUBLICATIONS

Sponsored Research Reports

Evaluating Induced Seismicity from Injection Wells, Final Report of Phases I and II to the *US Department of Energy Lawrence Berkeley National Laboratory, Earth Sciences Division*, Contract No. 7119854, Departments of Civil Engineering, University of Mississippi, June, 2016 (129 pp.)

Detecting Weakened Highway and Railroad Bridge Substructures at Deck Level, (with Elizabeth Ervin), Final Report to the *US Department of Transportation University Transportation Center: National Center for Intermodal Transportation and Economic Development*, Project No. UM 2013-26, Departments of Civil Engineering and Mechanical Engineering, University of Mississippi, June, 2016 (47 pp.)

Predicting Erosion Impact on Highway and Railway Bridge Structures, (with Charles Swann), Final Report to the *US Department of Transportation University Transportation Center: National Center for Intermodal Transportation and Economic Development*, Project No. UM 2013-25, Departments of Civil Engineering and Mechanical Engineering, University of Mississippi, June, 2016 (52 pp.)

Natural Hazard Mitigation Plan of The University of Mississippi, Lafayette County, Mississippi, (with Charles Swann), Final Report Update to *Federal Emergency Management Agency*, Center for Community Earthquake Preparedness, September, 2014 (135 pp.)

Three Integrated Projects to Enhance Non-Contact Rail Inspection Technology for Application to Substructure Health Evaluation on Both Rail and Road Bridges, (with Elizabeth Ervin, Vyacheslav Aranchuk, and James Chambers), Final Report to the *US Department of Transportation University Transportation Center: National Center for Intermodal Transportation and Economic Development*, Departments of Civil Engineering and Mechanical Engineering, University of Mississippi, and National Center for Physical Acoustics, January, 2014 (102 pp.)

Seismic Vulnerability Assessment of Critical Bridges in North MS, Final Report to *Mississippi Emergency Management Agency, Mitigation Division*, Department of Civil Engineering, University of Mississippi, December, 2011 (65 pp.)

Nano Particle Reinforced Composites for Critical Infrastructure Protection-with Multihazard Update, (with Alex Cheng, Ahmed Alostaz, and Raju Mantena), Final Report of Phases I, II, and III to *Oak Ridge National Laboratory, Southeast Region Research Initiative*, for *U.S. Department of Homeland Security, Infrastructure Protection Division*, Nano Infrastructure Research Group, University of Mississippi, September, 2010 (293 pp., without publications addendum)

FEMA 549 Mitigation Assessment Team Report: Hurricane Katrina in the Gulf Coast, (with Wind Damage Survey Team, Building Code Performance in MS), Final Report to *U.S. Department of Homeland Security, Federal Emergency Management Agency*, July, 2006 (483 pp., without appendices)

Natural Hazard Mitigation Plan for The University of Mississippi, Lafayette County, Mississippi, (with C. T. Swann and T. Panhorst), Final Report to *Federal Emergency Management Agency*, Center for Community Earthquake Preparedness, May 2006, approved by FEMA (131 pp.)

The State of Mississippi Standard Mitigation Plan-Earthquake Risk Assessment, Final Report to *Mississippi Emergency Management Agency*, Center for Community Earthquake Preparedness, August 2004, approved by FEMA (59 pp.)

Seismic Vulnerability of Existing Highway Bridge Substructures Supporting the I-55 Undercrossing at MS-302 (Goodman Road), Final Report to *Mississippi Department of Transportation*, Center for Community Earthquake Preparedness, October, 2002 (130 pp.)

Evaluation of Earthquake Effects on Selected Structures and Utilities at the University of Mississippi- A Mitigation Model for Universities, (with Charles Swann, Robert Hackett, Rod Stewart, and Carol Lutken), Final Report to *Mississippi Emergency Management Agency*, Department of Civil Engineering and Mississippi Minerals Resources Institute, December, 1999 (258 pp.)

Structural Seismic Vulnerability Evaluation of Baptist Memorial Hospital-Desoto, (with Robert Hackett and Charles Swann), Final Report to *Central United States Earthquake Consortium*, Department of Civil Engineering, University of Mississippi, and Mississippi Mineral Resources Institute, November, 1997

Evaluation of Earthquake Effects on the Lyceum, (with Robert Hackett and Charles Swann), Final report to *Mississippi Emergency Management Agency*, Department of Civil Engineering, University of Mississippi, and Mississippi Mineral Resources Institute, November, 1997

NCEER/FHWA Highway Project 106 Tasks E-7.1.1 and E-7.1.2: Vulnerability Assessment- Structure Fragility, (with A. S. Cakmak), Final Report to *Federal Highway Administration*, Department of Civil Engineering and Operations Research, Princeton University, **Technical Report NCEER-97-0017**, December, 1997 (94 pp.)

Seismic Vulnerability Evaluation of a North Mississippi Hospital, (with R. M. Hackett), Final Report to *Central U. S. Earthquake Consortium*, Department of Civil Engineering, November, 1997, (64 pp.)

Bronx-Whitestone Bridge Eyebars Investigation, (with Ron Maybaur), Weidlinger Associates, Final Report to *Triborough Bridge and Tunnel Authority*, June 1990 (234 pp.)

Structural Analysis and High Cycle Fatigue Evaluation of Crankshaft for SCORE 580 and Heat Transfer and Structural Analysis of Accessory End Housing and Intermediate Housing for SCORE 580, (with A. DiBiccari and D. Purnell),

ADAPCO Report Nos. 35-04-001 and 35-04-002, resp., Final Reports to *John Deere Technologies International, Inc., Rotary Engine Division*, August 1987 (106 pp. and 204 pp., resp.)

Archival Journal Publications

“Distributed Column Damage Effect on Progressive Collapse Vulnerability in Steel Buildings Exposed to an External Blast Event.” (with Jenny Sideri, Simos Gerasimidis, and George Deodatis), **ASCE Journal of Performance of Constructed Facilities**, **31** (5), (2017)

“Multi-hazard Risk Analysis and Resilience Indices for Critical Facilities on the Main Campus of the University of Mississippi,” (with Mamun Miah, and Kyle Bethay), **Homeland Security Review**, **8** (1):79-100 (2014)

Fire characteristics of steel members coated with nano-enhanced polymers (with Kathy Butler, Alex Cheng, and Ahmed Al-Ostaz), **Fire and Materials**, **38** (2), 227-240 (2014)

“Dynamic response and simulations of nano particle reinforced CMU wall panels subject to blast loading,” (with Mohammad Irshidat, Ahmed Alostaz, and Alex Cheng), **Journal of Structural Engineering**, **137** (10), 1193-1204 (2011)

“Interactive computational tool for simulation of dynamic response and damage in composite structures,” (with T. P. Tadepalli), **ASME Early Career Technical Journal** (2010)

“Seismic response interaction between subsurface geology and selected facilities at the University of Mississippi,” (with Charles Swann), **Engineering Geology**, **62(1-3)**, 223-250 (2001)
(Special issue on seismic hazards in the New Madrid fault zone)

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