

Ming L. Wang
Professor of Civil and Environmental Engineering
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Ming Wang is a Professor of Civil and Environmental Engineering at Northeastern University. He was formerly a Professor in the Department of Civil Engineering at The University of New Mexico (UNM) from 1985 to 1997 and a Professor of Civil and Materials Engineering at the University of Illinois at Chicago from 1997 to 2008. Before that, he taught as a visiting professor in the Departments of Civil Engineering at Princeton University in 1992 and at Northwestern University from 1983 to 1985. He has completed the guidance of 20 Ph.D., 8 Post-Doc, and 36 MS students.

Professor Wang has extensive research experience and knowledge in experimental mechanics and sensor technology for infrastructures. He has established and maintained a number of structural mechanics laboratories. He developed the following laboratories at UNM: the Structural Dynamics, Micromechanics, Mesomechanics, Material Processing, Material Response, and the Nondestructive Testing Laboratory. He has also developed a Structural Dynamics and Monitoring Laboratory, a Sensor Technology Laboratory, and a Real-Time Health Monitoring Station for Bridges at UIC. He was also the Co-Director of the newly established Sensor Enriched Urban Infrastructure Systems Center in College of Engineering at UIC. The development of a modern Sensor Technology Laboratories for Infrastructures is currently under way at Northeastern.

He has published more than 200 papers in various journals, conference proceedings, and edited books. He is the co-editor of *Micromechanics of Failure and Quasi-Brittle Materials* published by Elsevier Applied Science UK, and of *Vibration of Mechanical Systems and the History of Mechanical Design* published by the American Society of Mechanical Engineers. Dr. Wang was also awarded a United States patent (number 5,254,857) on the “Fast Scanning Electron Microscope” in 1993. He has also filed several disclosures and patents on EM sensor technologies currently under worldwide use.

Professor Wang’s extensive research experiences have included work on the micromechanics of failure in quasi-brittle materials (concrete and ceramic composites), constitutive law and damage mechanics of quasi-brittle materials, monitoring and damage assessment of large structural systems, sensor technologies and experimental techniques for infrastructure application, and probabilistic structural dynamics and vibration testing. His research evolved from focusing on applied mechanics and materials to focusing on experimental techniques and sensor technologies for health monitoring of long span bridges.

His most recent research supports and grants are from prestigious public organizations like the National Science Foundation (NSF), the Federal Highway Administration, and the Illinois Department of Transportation. Several private industries are actively seeking these technologies for implementation in bridges and structures and some have been supporting Professor Wang’s research as well. In fact, a joint venture between the university and a private company called

Smart Structure, LLC, is already under way. Smart Structures has been giving UIC numerous contracts to support Professor Wang's research efforts on sensor technology and monitoring systems for bridges.

He was a consultant and technical adviser for Ssang Yong Cement Industry Co. in Korea, where, since 1995, he oversaw the retrofit of Sung Bridge and designed a health monitoring system for Chung-Mu Bridge, both in Korea. Professor Wang is currently a consultant to the Keisoku Research and Consultant Company, a leading company in health monitoring and damage assessment for large structures in Japan.

Professor Wang's research has had a large influence on the health monitoring of civil infrastructures and the development of new sensor technologies for civil infrastructure applications. In addition, his research is having a strong international influence on futuristic monitoring technologies for large structural systems. His improvements of the electro-magnetic (EM) sensor to directly measure the stresses of large steel cables for cable-stayed bridges have gained much attention. Practical applications have been done in the United States, China, and in Japan. These applications include the installation of eighteen EM sensors of 150 mm diameter on cables of the Nanjing cable-stayed bridge, 16x200mm in diameter on Zhenjiang cable-stayed bridge, and 36x140mm diameter on Qianjiang Steel Arch Bridge in China, and eight sensors of 110 mm diameter on external cable for post-tensioning a segmental bridge and 400 x 30mm sensors on a sport dome in Japan. Additional applications include the measurement of 80 cable stresses for Waldo Bridge in Maine, USA and measurement of stresses of cables for highway retaining walls in Japan. An exclusive licensing agreement has been awarded to a company for worldwide marketing and use.

A joint industrial academic partnership has been initiated between the Civil and Materials Engineering Department at UIC and Infratech, Inc. in Illinois. An NSF Phase II Small Business Innovative Research Program (SBIR) has been successfully funded for a period of two years and a funding level of \$400,000 has been successfully secured for this program. Under the scope of this project, UIC is to develop the technology for cheap, reliable wireless sensors for infrastructure applications. Another NSF phase I & II SBIR project entitled "A New Magnetoelastic Force/Corrosion Sensor for Cable-Stays in Bridges Using Measurement of the Anhyseresis Curve" has also been completed.

Professor Wang has developed an excellent working relationship with the Illinois Department of Transportation. UIC has been providing valuable advice to the Illinois Department of Transportation in the context of bridge maintenance. Under a recent agreement between the Illinois Department of Transportation, the Federal Highway Administration, and UIC Civil and Materials Engineering Department, UIC has been awarded a grant of \$270,000 for year 2000, and \$260,000 for years 2001 and 2002, to showcase certain technological advances in the areas of structural health monitoring and structural rehabilitation. A multiyear project for rehabilitating the Kiskiwaukee Bridge in Illinois has been completed.

Professor Wang has obtained a total of 9 million dollars in funding during his career as a professor and he has been accelerating the pace and number of his research efforts during the past nine years at UIC. The total committed funding for his research program since 1997 from all

sources is more than 5 million dollars. The majority of his funding is from NSF. His focus on the research and development of sensors and damage assessment techniques for infrastructures is gaining recognition nationally and internationally and is attested to by his numerous invitations to be a keynote lecturer and to participate in industrial seminars as well as various national and international panels. Finally, Professor Wang was the recipient of UIC College of Engineering Faculty Research Award in 2000.

Professor Wang and his joint venture team have been awarded a multi-million dollar grant from NIST-TIP program to develop critical infrastructure sensing technologies. The objective is to create a cost-effective and safe way to monitor our civil infrastructure under normal driving conditions. This sensing technology will create a way to detect problems, both on the surface and subsurface, so that problems can be fixed in time and efficiently.

Current Research Projects:

1. Versatile Onboard Traffic Embedded Roaming Sensors, **NIST Technology Innovation Program FY 2008 TIP Competition**. Total 18.8 million over five years; \$9 millions from NIST and 9.8 million from matching fund by joint venture participants. February 1, 2009- January 31, 2014. Funded; **Principal Investigator & Director**. Joint Venture with Industry and Universities.
2. Development of a Nanostructured-based Sensor System for Reliable Detection of Improvised Explosive Devices, **NSF**, \$560,000. September 1, 2007-Aug. 31, 2010. **Co-PI** with Professor Indacochea.
3. Bio-inspired Sensing and Actuation Technologies for Civil and Mechanical Systems- A Bilateral US-Taiwan Workshop, **NSF**, \$43,000. **PI**; February 18, 2009- July 31, 2010.
4. Turning the Civil and Mechanical Infrastructures into a “Smart Structures and Systems through the Adoption of Bio-inspired Sensing and Actuation Technologies. Sep.2008-Aug. 2009. **NSF**, \$15,000. **PI**.
5. Collaborative Research: Sensor Fusion for Comprehensive Health Monitoring of Complex Infrastructure Systems- An International Testbed Opportunity, **NSF**, \$130,000 /\$350,000. Sep. 1, 2007-Aug31, 2010, **PI**; Co-PIs: Jerry Lynch (UM) and Y. Zhang (Lehigh).
6. Hurudin Box Girder PC Bridge Health Monitoring System, \$ 330,000. Dec. 2008- Dec. 2009. **PI**; **New West Development Co.** China.

Recent scholar activities:

1. Health Monitoring of Large Steel-Cable Systems. **Seminar** at University of Illinois at Urbana- Champaign, Nov. 28, 2005.
2. Health Monitoring of Large Structural Systems. **Keynote Speaker** at the Second International Conference on Structural Health Monitoring of Intelligent Infrastructure, Nov.17, 2005, Shenzhen, China.
3. Damage Assessment and Monitoring of Long-Span Bridges. **Plenary Speaker** at US-China Workshop on Smart Structures & Smart Systems in Jinan, China, Oct.17, 2005.

4. Health Monitoring for Design, Construction, and Maintenance of Civil Infrastructures. **Keynote Speaker** at International Workshop on Structural Health Monitoring. Sep.12-14, 2005, Stanford, CA.
5. Health Monitoring of a Box Girder Bridge. **Keynote Speaker**; Second International Workshop on Advanced Smart Materials and Smart Structures Technology. Gyeongju, Korea, on July 21, 2005.
6. Damage Assessment and Health Monitoring of a Box Girder PC Bridge. **Invited Speaker**, International Symposium on Innovation and Sustainability of Structures in Civil Engineering, Nanjing; Nov., 20. 2005.
7. Health Monitoring of Large Steel-Cable Systems. **Seminar** at University of California-San Diego, March 2006.
8. A sensor for Monitoring Large Cable Systems for Ground and Slope Anchors, **Dinner Speaker** at Association of Environmental and Engineering Geologists, May 16, 2006.
9. Advancement in Real -Time Health Monitoring Technology for Bridges, Lehigh University, Oct.2006.
10. Joint US-Japan Workshop on Bridge Maintenance, FHWA, **Invited Speaker**, Seattle, Nov. 2006.
11. FHWA Long Term Bridge Performance Program Meeting, **Invited Panelist**, Las Vegas; Jan. 2007.
12. Long-term Health Monitoring for Bridges, South Carolina DOT; Columbia, **Invited Speaker**, Nov.2006.
13. Sensor Enriched Infrastructure System, Northeastern University, July 6, 2007, **Invited Speaker**.
14. EM Sensor technology for Stress Measurement of Steel Cables, University of Virginia, **Invited Speaker**, April 23, 2007.
15. Bridge Health Monitoring Technology, Headquarters of Hangzhou Bay Bridge, Ninbo, P.R.China. May 21, 2007. **Invited Speaker**.
16. Long term Health Monitoring for Bridges, **Invited Speaker**, Hawaii Department of Transportation, May 2007.
17. Sensor Technology for Infrastructure Applications, **Invited Speaker**, University of Hawaii, May 10, 2007.
18. Sensor Enriched Infrastructure System, US-Japan Workshop on Advanced Sensor Technologies for Safe and Secure Societies and better quality of Life. **Keynote Speaker** Tokyo, Japan, July 20-23, 2007.
19. Long Term Bridge Health Monitoring system for Kiskiwaukee Bridge, **Invited Speaker**, Illinois Department of Transportation, Maintenance Meeting, Aug 9, 2007.
20. Health monitoring of large structural systems, **Keynote speaker**, The 11th Biennial ASCE Aerospace Division International Conference on Engineering, Science, Construction, and Operations in Challenging Environments(Earth & Space 2008), Long Beach, California, U.S.A. March 03–05, 2008.

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Personal Data

Citizenship: U.S.A.

Education

Post-Doctoral Fellow, Northwestern University, Evanston, Illinois, USA, 1983-1985 (Research and Teaching), Experimental Mechanics and Cementitious Materials (with Professor S.P. Shah).

Ph.D., University of New Mexico, USA, May 1983, Structural Dynamics and Random Vibration, Force Identification of Nonlinear Dynamic System. (With Dr. Thomas L. Paez).

Research Experience and Interest

Experimental Research and Analysis - Experience with emphasis on material properties and mechanics of materials; MTS (30 Kips) and Instron Biaxial Testing Machine (110 Kips, 50 in-Kips), data acquisition, and image processing; X-ray (160 Kev) and Laser holography interferometry for strain measurement; Scanning Electron Microscope (SEM), Environmental Scanning Electron Microscope (ESEM) and Transmission Electron Microscope (TEM) for micro-mechanics studies of quasi-brittle materials; TEM sample preparation; developed the first Fast Scanning Electron Microscope (FSEM).

Structural Dynamics and Random Vibration - Experience with emphasis on random vibration testing, data acquisition and reduction, vibration qualification of equipment; shaker table instrumentation and testing; probability analysis of structures, system identification, nonlinear vibration analysis and adaptive filtering; numerical integration and filtering techniques, earthquake engineering and design, retrofitting of bridges, and system identification and modal analysis.

Cementitious Materials, Rock Salt and Ceramic Composites - Experience in nonlinear reinforced concrete analysis, reinforced concrete design for earthquake and blast loadings; research on high strength cement based materials, fiber reinforced concrete and SIFCON; testing of R.C. beam-column joints; fracture of concrete and ceramics, micromechanics of quasi-brittle materials and micromechanics of ceramics; ceramic processing (Al_2O_3 and MgO), and cement hydration with fly ash; constitutive modeling and triaxial experiments for creep of crushed rock salt and intact rock salt for waste management. Testing and application of Recycled Plastic Composites.

Nondestructive Testing for Concrete Structures- Experience with Impact Echo techniques for determination of concrete strength, defects, and reinforcement locations; Holographic Interferometry and Speckle Interferometry techniques for full field in-plane displacement measurement and damage detection. Modal analysis of prototype highway bridges. Design health monitoring systems for long span bridges.

Sensor Technology for Infrastructures- Develop Electro-magnetic(EM) Stress sensor for direct stress measurement of Ferro materials for steel cable sizes of 5mm to 200mm. Applications including stress measurements of prestressed strands and tendons, cables for cable- stayed bridge, cables for suspension bridges, and cables and rebars for dome. Develop wireless PVDF sensors for strain and displacement measurements for rapid inspection and road testing of bridges.

Monitoring and Health Assessment of Bridges- Design and install a real time bridge monitoring system for Kisiwaukee bridge- a PC box-girder bridge with extensive cracking during the construction due to unhardened epoxy in Illinois. Stress monitoring of cables for Nanjing 2nd Cable-stayed Bridge in Nanjing, Qianjiang Steel Arch Bridge in Hanzhou, China. Design and install the Monitoring System for Zhangjiang Cable-Stayed in China. Design a health monitoring system for Chung Mu steel truss arch bridge in Korea.

PROFESSIONAL BACKGROUND

Professor Civil and Environmental Engineering, Northeastern University, Since 2008.

Professor Civil and Material Engineering, University of Illinois at Chicago, 1997-2008.

Professor Civil Engineering, University of New Mexico, 1995-Dec. 1996.

Visiting Associate Professor Civil Engineering and Operations Research, Princeton University, NJ. Taught Structural Dynamics and performed analytical and experimental micromechanics research for ceramics composites. 1992.

Associate Professor Civil Engineering, University of New Mexico, 1990-1995

Assistant Professor Civil Engineering, University of New Mexico. 1985-1990.

Research Associate in experimental research, development, and analysis with Professors Shah and Keer, Civil Engineering Department, Northwestern University, Evanston, IL. Wrote proposals on dynamic testing of reinforced concrete structures; developed, designed and set up vibration testing instruments including electromagnetic shaking table, measurement instrumentation and computer-based data acquisition system. Conducted analysis on nonlinear reinforced concrete constitutive modeling based on dynamic loading of beam-column joints; performed experiments and analyses to determine the dynamic response and damage diagnosis of model reinforced structures by using shaking table tests, R.C. design, experimental mechanics and scaling techniques.

Taught Statics, Dynamics, and Earthquake Engineering and supervised graduate students. 1983-1985.

Research Assistant in Vibration experiments and analysis to Dr. Thomas Paez, University of New Mexico, Albuquerque, NM. Performed mathematical modeling of inelastic dynamic systems and testing of nonlinear hysteretic structures by using MTS testing systems and performing parameter identification of damaged structures. This investigation can be applied to estimate damage and structural response to buried protective structures, structures location in seismic zone and aerospace structures. 1980-1983.

Research Assistant in Material Engineering applications to Dr. V. Ramakrishnan, South Dakota School of Mining and Technology, Rapid City, SD. Performed experiments involving blended concrete, fiber-reinforced concrete, fly-ash concrete, and super-plasticized concrete with emphasis on testing of construction material properties, industrial application, and experimental techniques. 1978-1980.

Engineering Officer Civil Engineering and Construction Management, Naval Marine Corps, Taiwan, Republic of China. Supervised construction of Sawsan Rifle and Rocket Range, Kaoshiung, Taiwan. Directed rebuilding and redesign of damaged structures and entire drainage-sewerage system of a large military installation, after an extremely destructive typhoon struck Taiwan. Accomplished reconstruction of facilities in a record of six months. 1976-1978.

Awards

Jefferson Goblet Paper Award, Simulation of Random Vibration Using a Microcomputer in a Shaker Table, Paper #87-0897-CP, presented at 28th AIAA (American Institute of Aeronautics and Astronautics) Structural Dynamics and Materials Conference, Monterey, CA, 1987.

Halliburton Lectureship Award, The University of New Mexico, 1989-1992.

College of Engineering Research Award, University of Illinois-Chicago, 2001

RESEARCH GRANT and CONTRACT at UIC (1997-2008)

Total funding at UIC is over 5 millions.

1. Advanced Monitoring System for Long-Span Bridges, **NSF**, PI. \$ 361,497. Plus NSF funded equipment valued at \$130K that was transferred from UNM to UIC. March 1997-Feb. 2000.
2. Magneto-Elastic Stress Sensor- An international cooperative Research Program, PI, **NSF**. \$ 50,000, Sep 1997-May.2001.
3. Faculty Start-up Equipment Grant, **UIC**, \$130,000.
4. Damage Assessment of Kishwaukee Bridge. The University of Illinois at Chicago (**UIC**) Office of Vice Chancellor , Research Center Seed Grant Initiative, PI, \$100,000.

5. Magneto-Elastic Sensors for Post Earthquake Damage Detection in Steel Structures, April 1998- March 2001; **NSF**; \$ 258,000. PI.
6. A Wireless PVDF Strain Sensor for Infrastructural Monitoring, **NSF-SBIR Phase I**, Infratech Inc., Jan-June 1998, Co-PI, **NSF**. \$ 99,000.
7. Bridge Research Center, The University of Illinois at Chicago (**UIC**) Office of Vice Chancellor of Research Center Seed Grant Initiative, PI, \$90,000. June, 1999-July 2000.
8. A Wireless PVDF Strain Sensor for Infrastructural Monitoring, **NSF-SBIR Phase II**, Infratech Inc., Aug. 1999-July 30, 2001, Co-PI, **NSF**. \$ 400,000. Subcontract to UIC, \$99,800.
9. Monitoring & Damage Assessment of the Kishwaukee Bridge, PI; **IDOT**, \$270,000. Aug. 1999- Dec. 2000.
10. Stress Monitoring of Cables for Nanjing Second Yangtze River Bridge, Nanjing China, \$62,000. Oct. 1, 2000- Dec. 2001. **Shanghai Ship and Shipping Research Institute**. PI.
11. Stabilized Methods with Embedded Multiscales: A framework for Computational Solid Mechanics. **NSF**, Funded as a pilot project \$41,000. Nov. 15, 2000-Sep. 30, 2001. Co-PI with Arif Masud.
12. Advanced Monitoring System for a Post-tensioning Segmental Concrete Box Girder Bridge (Kishwaukee Bridge, IL), **IDOT**, \$260,000, Jan. 1, 2001-Dec.31 2002. PI.
13. A new Magnetoelastic Force/Corrosion Sensor for Cable-stays in Bridges Using Measurement of the Anhysteresis Curve, **NSF SBIR Phase I** with **Infratech Inc.** \$99,000, Jul. 2001-Dec. 2001.
14. Evaluation of Bridg Inspection and Assessment in Illinois, **IDOT-ITRC Project**, \$180,000; Sep. 2001-Aug. 2003. Co-PI with S. McNeil and F. Ansari.
15. Us-China symposium on Multi-scale Modeling of Materials, **NSF**, \$20,000. June 2001-Aug. 2003. Co-PI with Arif Masud.
16. Development of Sensor Technologies and Monitoring System for Bridges, **Smart Structures Inc.** \$ 547,000 Feb. 1, 2002- Dec. 31, 2006. PI.
17. South-Bound Kishwaukee Bridge Monitoring Station Follow-on Maintenance and Analysis, **IDOT**, \$150,000. July 1, 2003-June, 2006. PI.
18. Development of a Remote Coil Magnetoelastic Stress Sensor for Monitoring Steel Cables and Tendons; **NSF**, \$276,000; Dec. 2000- Dec. 2004. PI.
19. An Interdigitated PVDF Guided Wave Transducer for Large Array Condition Monitoring of Steel Structures, **NSF**, \$230,000. Sep.2002-Aug. 2005. Equipment Matching from UIC, \$12,000.
20. Magneto Elastic and Electrochemical Techniques for Detection of Early Corrosion in Steel Cable and Reinforcement. **NSF**, \$270,000. Sep. 2002-Aug.2006. Co-PI with E. Indacochea. Equipment matching from UIC \$19,000.
21. Wireless Dense Array for Infrastructure Monitoring. **NSF US-China Protocol** for Scientific and Technical Cooperative Research in Earthquake Studies. A Joint Proposal with Infratech Inc and Institute of Mechanics in China. \$312,000. Subcontract to UIC \$90,000. March 2002-Sep. 2005. PI.
22. **NSF REU** supplement grant for undergraduate research. \$12,000, March 2003-Sep. 2004. PI.
23. Installation 36 EM sensors to Measure Stresses of Cables for **Qingjing 4th Bridge in Hangzhou**, PRC. \$65,000, Feb. 2003- March. 2005. PI.

24. **Zhenjing Bay Bridge** Monitoring System Design, Sensor Integration, Software Design, and Installation. \$260,000, Jan. 2005- Nov. 2006. **PI**.
25. An Interdigitated PVDF Guided Wave Transducer for Large Array Condition Monitoring of Steel Structures, **NSF**, Supplement Award for cooperative research with Nanjing University of Aeronautics and Astronautics. \$ 59,445. Sep. 2004- Sep. 2005. **PI**.
26. Creep Damage Analysis and Remaining Life Assessment of Ferromagnetic Materials Exposed to High Temperatures, **NSF**, \$200,000. July 2004-June 2007. Co-PI with Indacochea. Equipment matching from UIC \$9,000.
27. Health Monitoring of Cables for Waldo Cable-Stayed Bridge in Maine, USA. **DSI International**, \$80,000. Aug. 1005-Dec. 2006.
28. Hurudin Box Girder PC Bridge Health Monitoring System; Naning, China, \$ 100,000. April 2006- May2007.
29. Zhenjing Bay Bridge Monitoring System Design, Sensor Integration, and Software Design. Intelligent Instrument System, \$100,000, Jan. 2005-Dec. 2007. **P**
30. US-China Cooperative Program in Integrated Structural Health Monitoring with Emphasis on Earthquake and Natural Hazard Applications, \$120,000, **NSF**; Sep. 2004-Aug.2008. **PI**.
31. South-Bound Kishwaukee Bridge Monitoring Station Follow-on Maintenance and Analysis, **IDOT**, \$ 135,000. July2007 –July 2008, **PI**.
32. Nanostructured Sensors for Detecting Low Levels of Hydrogen at Low Temperatures, **NSF**, \$220,000, Sep. 1 2005- Aug. 2008. **PI**.

RESEARCH GRANT and CONTRACT at UNM (1985-1996)

Total funding at UNM is about 3.5 million.

1. Advanced Monitoring System for Long-Span Bridges, **NSF**; \$ 150,000. May 15 1996- Dec 1996, **PI**.
2. Monitoring and Health Assessment of Sung San Bridge, **SsangYong Cement Industrial Inc. Seoul, South Korea**. \$120,000. Aug.1995-Aug. 1996. **PI**.
3. Experimental and Numerical Investigations on Failure Mechanisms in Fiber-reinforced Ceramics, **AFOSR**, \$ 210,000; Apr. 1995- Apr. 1998. **PI**, H. Schreyer (Co-PI) , **ACC#3-43681**.
4. Experimental and Theoretical Investigations of Removal of Waste from a Waste Repository Caused by Drilling, **DOE**, \$60,000, **Funded**; July 1, 1996 - Jul. 1997. .
5. Mechanical Properties and Durabilities of Recycled Plastic Composites for Highway Guardrail Post, **Innovative Recycling Corporation**; \$ 10,000, April 1996- Dec. 1996.**PI**.
6. Advanced Monitoring System for Highway Bridges, Alliance Transportation Research and **New Mexico State Highway Department**, \$ 20,000; Feb. 1996-June 1996, **PI**, **Acc# 3-46131**.
7. Electronic Shearography for Structural Testing -- Nondestructive Testing for Bridges, **NSF**, \$143 K, Jan 1993-Jun 1996, Co-PI with A. Maji. **ACC# 3-26841**.
8. The Correlation of Bifurcations with Failure Modes in Quasi-Brittle Materials, **NSF**, \$155K, Feb 1993-Jun 1996, Co-PI with H. Schreyer. **ACC# 3-26921**.
9. Undergraduate Research Experience, **NSF**, \$40 K, Mar-Aug 1996, Co-Investigator with Walter Gerstle.
10. Mechanical Properties of WIPP Waste Surrogate Materials for Drill Cutting, **DOE**, **WERC**, \$66K, May 1994-Jan. 1996, **PI**. **ACC# 3-28471**.

11. Constitutive Properties of Consolidated Wet Crushed Rock Salt for Drill Cuttings, **Sandia National Labs**, \$50 K (1993), \$50 K (1994), 20K (1995)PI. (Additional Funds were provided by NMERI to develop a Material Response Laboratory including an INSTRON quarter-million pound computer controlled machine (\$250K); a 10,000 lb Triaxial Cell (\$45), and a budget for laboratory remodeling and a technician). ACC# 31550-03.
12. A Micro- and Macro-Mechanical Investigation of Creep Mechanisms for Rock Salt, **DOE**, WERC, \$75K, Apr 1993-May 1994; \$65K, May 1994-Jan. 1996 Co-PI with Z. Chen. ACC# 3-28321 and 8-31110.
13. Healing Mechanisms of Crushed Rock Salt With Water, **DOE**, WERC, \$70K, Apr 1993-Aug 1994, PI. ACC# 3-28211.
14. Interaction Effects of Cracks, Flaws and Damage in Quasi-Brittle Materials, Air Force Office of Scientific Research (**AFOSR**), \$100 K, Oct 1991-May 1994, Co-PI with H. Schreyer. ACC# 3-23841.
15. A Micro- and Macro-Mechanical Investigation of Creep Mechanisms for Rock Salt, **DOE**, WERC, \$75 K, Apr 1993-May 1994; Co-PI with Z. Chen.
16. A Micro- and Macro-Mechanical Investigation of Creep Mechanisms for Rock Salt, **DOE**, WERC, \$40K, 1992, Co-PI with Z. Chen.
17. Deformation Mechanisms of Crushed Rock Salt, **DOE**, WERC, \$115 K, May 1991-Feb 1993, PI. (This project is also part of a DOE Equipment Grant to purchase a new Environmental Scanning Electron Microscope in collaboration with 5 other Waste Management related studies, \$300 K, 1992, **DOE**).
18. Development of a High-Imaging-Speed Scanning Electron Microscope for Dynamically Loaded Materials, Air Force Office of Scientific Research (**AFOSR**), \$460 K, 1987-1990, PI and Co-PI with Dr. Tim Ross of ISI Corp.
19. Effects of Nonlinear Structural Responses on Nuclear Power Plant Risk, **NRC** and **Sandia National Labs**, \$80K, 1989-1990, PI.
20. Shock Phenomenon of Concrete, Soils, and Interface, **AFOSR**, Total \$430 K plus \$30 K Equipment Matching Fund (UNM), and \$55 K Labs Remodeling (UNM), 1988-1990, Co-PI with Professor H.L. Schreyer.
21. Force Identification from Linear and Nonlinear Structural Responses, **Sandia National Labs**, \$60K, 1986-1988, PI.
22. Undergraduate Research Experience, **NSF**, \$40 K, Mar-Aug 1993, Co-Investigator with Walter Gerstle.
23. Undergraduate Research Experience, **NSF**, \$100K, 1990-1992, Co-PI with Dr. Tim Ross. Contract #EID-9200117, EID-9100822, EID-9000744.
24. Microstructural Studies of Ionic Polymeric Gel Muscles Using Environmental Scanning Electron Microscope, **Sandia National Labs**, \$8 K, 1992, PI.
25. Properties of Geosafe Offgas Hood Fabric, **Los Alamos** Technical Associates, \$16K, 1991, PI.
26. International Micromechanics Conference, **NSF**, \$10 K, **Sandia National Labs**, \$5 K, 1990, PI.
27. Equipment Qualification for Protective Structures, **NMERI** and **Air Force Weapons Labs**, \$10K, 1989, PI.
28. Stochastic Analysis of Reinforced Concrete Buried Structures, **Air Force Weapons Lab**, \$15K, 1986.

Publications:

Published Edited Books

- Micromechanics of Failure of Quasi-Brittle Materials. Editor and Co-Editor with S.P. Shah and S. Swartz. **Elsevier Applied Science Publisher**, UK, June 1990. 650 pages.
- Vibrations of Mechanical Systems and the History of Mechanical Design, DE-Vol. 63. Co-Editor with R. Echempati, J. Roger, and D. Morrison. **ASME Publication**, Sep 1993. 150 pages.

Patent

- Fast SEM Dynamic Microscopy, US Serious #07/ 708, 505. **Patent Granted** Oct. 19, 1993. Patent # 5,254,857. With Dr. T. Ross.

Refereed Journals and Edited Books

1. Wang, M.L. and S.P. Shah. Reinforced Concrete Hysteresis Model Based on the Damage Concept. **Journal of Earthquake Engineering and Structural Dynamics**, 15. 1987. 993-1003.
2. Shah, S. P., Wang, M.L. and L. Chung. Model Concrete Beam-Column Joints Subjected to Cyclic Loading at Two Rates. **Journal of Materials and Structures**, 20. 1987. 85-95.
3. Wang, M.L., T. Paez and F. Ju. System Identification of Nonlinear Damaged Structures. **International Journal of Analytical and Experimental Model Analysis**, 2, No. 3. 1987. 128-136.
4. Wang, M.L., Shah, S.P and J. P. Baker. An Electromagnetic Closed-Loop Materials Testing Station. **SEM Experimental Technique**, 14, No. 4. 1990. 52-56.
5. Maji, A., S. Paul and M.L. Wang. Improved Impact-Echo Technique by Signal Processing. **ASJN Journal of Nondestructive Evaluation**, 2. 1990. 45-56.
6. Wang, M.L. and V. Ramakrishnan. Evaluation of Blended Cement, Mortar and Concrete Made from Type III Cement and Kiln Dust. **Journal of Construction and Building Materials**, 4, No. 2. June 1990. 78-85.
7. Wang, M.L. and D. Keierleber. Investigation of Shear Strength of SIFCON Using Torsion Tests. **Journal of Construction and Building Materials**, 5, No. 2. June 1991. 93-100.
8. Wang, M.L., H.L. Schreyer and C.A. Rutland. Internal Deformation Measurements with the Use of Real Time X-Rays. **Experimental Techniques**, 15, No. 4. 1991. 43-47.

9. Wang, M.L., R. J. Macy and L. Z. Tan. Fracture Study of Quasi-Brittle Material Using a Fast Scanning Electron Microscope (FSEM). **Experimental Techniques**, 16, No. 1. 1992. 29-36.
10. Kreitinger, T., M. Wang and H. Schreyer. Non-parametric Force Identification from Structural Response. **Journal of Soil Dynamics and Earthquake Engineering**, 11. 1992. 269-277.
11. Wang, M.L and J. Wang. Nonlinear Dynamic Analysis of R. C. Shear Wall Structures. **Journal of Soil Dynamics and Earthquake Engineering**, 11. 1992. 255-268.
12. Ross, T. J. and M.L. Wang. Fast Scanning Electron Microscope (FSEM), **United States Patent Publication**, Patent Number 5,254,857. Oct 19, 1993.
13. Hwang, C.L., M.L. Wang and S. Miao. Proposed Healing and Consolidation Mechanisms of Crushed Rock Salt Revealed by ESEM. **Journal of Microscopy Research and Technique**. 1993. 25:456-464.
14. Wang, M.L. Comparison of Responses of Various Nonlinear Concrete Reinforced Models. **Journal of Soil Dynamics and Earthquake Engineering**, 12. 1993. 433-444.
15. Maji. and Wang, M.L. Nondestructive Techniques, Impact-Echo Technique. **Structural Testing Handbook**, Chap 12, Sec 12.4. Lilburn, Georgia: Fairmont Press, 1993. 280-287.
16. Wang, M.L. Real-Time Radiography. **Structural Testing Handbook**, Chap 12, Sec 12.5. Lilburn, Georgia: Fairmont Press, 1993. 287-294.
17. Wang, M.L. and A.K. Maji. Shear Properties of Slurry Infiltrated Fiber Concrete (SIFCON). **Journal of Construction and Building Materials**. Vol.8, No. 3, Sep 1994.161-169.
18. Wang, M.L. and T. Kreitinger. Identification of Force from Response Data of a Nonlinear System. **Journal of Soil Dynamics and Earthquake Engineering**. 13 (1994) 267-280.
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82. Hybrid Frequency Response Characteristics of a Low-Frequency Charge-Mode PVDF Curvature Sensor Measured with a Random Vibration Method. ASME International Adaptive Structures and Materials Systems Symposium, Nov. 11-16, NY, New York. 2001. With Y. Zhang and G. Lloyd.
83. Experimental Evaluation of Differential Thermal Errors in Magnetoelastic Stress Sensors. IEEE Sensors 2002, 12-14 June, Florida. With G. Lloyd and Varsha Singh.
84. Comparison of Surface H-field Measurements Using Hall Sensors and a Novel Multiple Coil sensor. IEEE Sensors 2002, 12-14 June, Florida. With O. Hovorka and G. Lloyd.
85. Sensor Technology and Damage Assessment of Concrete Structures. FIB Congress, Osaka, Japan, 13-19, Oct. 2002. with J. Halvonic.

86. Failure Mechanisms of Quasi-Brittle Materials- Experimental Observations and Computer Simulations. The Sino-US Joint Symposium on Multi-Scale Analysis in Material Sciences and Engineering, June 17-20, 2002; Beijing, China.
87. Health Assessment of Kishwaukee River Bridge. In proceedings of 2002 SEM Annual Conference. June 10-12, 2002, Milwaukee Wisconsin, USA.
88. Smart Health Monitoring System of a Prestressed Box Girder Bridge. ICANCEER 2002, Hong Kong, Aug. 17-18. with X Wang.
89. The Utilities of U-shape EM Sensors in Stress Monitoring of Steel Cables. The US-Korea Workshop on Smart Structural systems, Busan, Korea, 23-24 August, 2002. With G. Wang.
90. Elasto-Magnetic Sensor Utilization on Steel Cable Stress Measurement, FIB Congress, Osaka, Japan, 13-19 October,2002. with S. Sunitro and A. Jarosevic.
91. Magnetoelastic Corrosion Sensing of Steel Cables. Workshop on Smart Structural Systems- US-Japan Cooperative Research Programs on Smart Structural Systems and Urban Earthquake Disaster Mitigation. Oct. 18, 2002. BRI, Tsukuba, Japan. 325-332.
92. Sensor Technology and Damage Assessment of Concrete Structures. FIB Congress, Osaka, Japan, 13-19, Oct. 2002.
93. Quantitative Validation Testing of Magnetoelastic Corrosion Sensing for Bridge Cables. SPIE Symposium on Smart Systems and NDE for Civil Infrastructures, March2-6, 2003, San Diego, CA. with Varsha Singh & G. Lloyd.
94. Results and Recommendation for Intelligent Bridge Monitoring Systems. SPIE Symposium on Smart Systems and NDE for Civil Infrastructures, March2-6, 2003, San Diego, CA. with X. Wang.
95. Thermal Behaviour of Magnetic Stress Sensors at Different Reynolds Numbers. 6th ASME/JSME Thermal Engineering Joint Conference, March 16-20,2003. TED-AJO3-591. with G. Lloyd, and O. Haovorka.
96. Effects of Temperature and Corrosion Thickness and Composition on Magnetic Measurements of structural Steel Wires. March 16-20, 2003. TED-AJO3-596. with Varsha Singh & G. Lloyd,
97. Recommendations for Intelligent Bridge Monitoring Systems. Proceedings of International Symposium on Diagnosis, Treatment and regeneration for Sustainable Urban Systems, Invited Lectures, March 13-14,2003, Ibaraki, Japan.
98. Intelligent Bridge Monitoring Systems: Architecture and Temperature Compensated Bootstrap Analysis, Proceedings , March 7-8, 2003. San Diego, CA. with G. Lloyd.

99. Damage Assessment of a PC Box Girder Bridge Using Modal Data. ASME 2003 DETC, 19th Biennial Conference on Mechanical Vibration and Noise, Sep. 2-6, 2003, Chicago IL. With G. Lloyd and F. Xu.
100. Opportunities for Magneto-Elastic Sensors for Corrosion Monitoring of Bridges. The 4th International Workshop on Structural Health Monitoring, Sep. 15-17, 2003. Stanford, CA. With V. Singh.
101. Bootstrap Analysis of Long Term Global and Local Measurements of the Kiskiwaukee Bridge. The 4th International Workshop on Structural Health Monitoring, Sep. 15-17, 2003. Stanford, CA. With G. Lloyd.
102. Measurement of stresses of very large cables. In proceedings of First International Conference on Structural Health Monitoring and Intelligent Infrastructure (SHMII-1'2003), Tokyo, Japan, November 13-15, 2003. With G. Wang. Invited paper.
103. Residual Stresses and Failure of Silicon Nitride-to-Stainless Steel Braze Joints. AIT-NSF Workshop on Nano, Material, Continuum and Computational Mechanics, 11-12 Dec. 2003, AIT Thailand. With J. Fan, E. Indacochea. Invited paper.
104. A Multi-Channel Wireless PVDF Displacement Sensor for Structure Monitoring. Proceeding of ICFRC International Conference on Fibre Composites, High Performance Concretes and Smart Materials, Vol. II, Edited by V. S. Parameswaran, Allied Publishers Private Limited. pp. 1003-1013, Jan. 2004. Invited paper.
105. Modeling of Structural Steel and Magnetic for NDE Corrosion Sensing. Smart Structures/ NDE Joint Conference. SPIE Symposium on Smart Systems and NDE for Civil Infrastructures, March 15-18, 2004, San Diego, CA. with Varsha Singh & G. Lloyd.
106. Smart Health Monitoring System for PC Bridge Bridges. Structures/ NDE Joint Conference. SPIE Symposium on Smart Systems and NDE for Civil Infrastructures, March 15-18, 2004, San Diego, CA. with X. Wang H. Chen Y. Zhao.
107. Design and Experimental Validation of a Wireless PVDF displacement Sensor for Structural Monitoring. SPIE Symposium on Nondestructive Evaluation for Health Monitoring and Diagnostics, March 15-18, 2004, San Diego, CA. with H Gu and G. Lloyd.
108. Concrete structures health monitoring system using actual stress measurement. In proceeding s of CONSEC International Conference. June 27-30, 2004.
109. Application of EM Stress Sensors in Large Steel Cables. The US-Korea Joint Workshop on Smart Structures Technologies, Sep. 2-4, 2004 Seoul Korea. With G. Wang. Invited paper.
110. Applications of Maganetoelastic Sensors to force Measurement in Large Bridge Cables; Structural Materials Technology: NDE/NDT for Highways and Bridges 2004. Sep. 14-17, Buffalo, NY, USA. With Y. Zhao.

111. Components of a Real-Time Monitoring System for a Segmental Precast Concrete Box Girder Bridge. Structural Materials Technology: NDE/NDT for Highways and Bridges 2004. Sep. 14-17, Buffalo, NY, USA. With G. Lloyd and X. Wang.
112. Application of EM Stress Sensors in Large Steel Cables. The International Conference on Earthquake Engineering. 19-20 Oct. 2004, Nanjing, China. With G. Wang and Y. Zhao. Invited paper.
113. Long Term Monitoring on external tendon of post-tensioned box girder bridge by utilizing EM sensory technology. In proceedings of IABMAS 2004. 20-23 Oct. 2004, Kyoto, Japan.
114. Application of EM stress sensors in Large Steel Cables, North American Euro-Pacific Workshop on Sensing Issues in Civil Structural Health Monitoring, Nov. 10-13, 2004. with G. Wang and Y. Zhao. Invited paper.
115. Structural Health Monitoring System Application in Japan, North American Euro-Pacific Workshop on Sensing Issues in Civil Structural Health Monitoring, Nov.10-13, 2004. with S. Sumitro. Invited Paper.
116. Advanced Sensor Technologies for Civil Infrastructure Application, In proceedings of US-India Workshop on Smart Structure Technologies. Dec. 19-22, 2004. Bombay, India. Invited paper.
117. Interdigital PVDF Transducer for Lamb Wave Generation and Reception, Smart Structures/ NDE Joint Conference. SPIE Symposium on Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems, March 7-10, 2005, San Diego CA. with H. Gu.
118. Application of EM Stress Sensors in Large Steel Cables. Smart Structures/ NDE Joint Conference. SPIE Symposium on Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems, March 7-10, 2005, San Diego CA. with G. Wang.
119. In-Service inspection of deck beam bridge. Smart Structures/ NDE Joint Conference. SPIE Symposium on Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems, March 7-10, 2005, San Diego. With R. Wang and V. Singh.
120. Statistical detection method for time of arrival and frequency of waves. Smart Structures/ NDE Joint Conference. SPIE Symposium on Sensors and Smart Structures Technologies for Civil, Mechanical, and Aerospace Systems, March 7-10, 2005, San Diego. With S. Shin and G. Lloyd.
121. Bridge Health Assessment with Fatigue Analysis Algorithm. Smart Structures/ NDE Joint Conference. SPIE Symposium on Sensors and Smart Structures Technologies

122. Slow Lamb wave generation using a PVDF transducer, In Proceedings of IMECE Conference. Nov. 2005. With G. Lloyd.
123. Health Monitoring of Large Structural Systems. **Keynote Speaker**, In proceedings of at The Second International Conference on Structural Health Monitoring of Intelligent Infrastructure, Nov. 17, 2005, Shenzhen, China. With X. Wang.
124. Damage Assessment and Monitoring of Long-Span Bridges. **Plenary Speaker**, In Proceedings of US-China Workshop on Smart Structures & Smart Systems in Jinan, China, Oct.17,2005.
125. Health Monitoring for Design, Construction, and Maintenance of Civil Infrastructures. **Keynote Speaker**, In Proceedings of International Workshop on Structural Health Monitoring. Sep. 12-14, 2005, Stanford, CA.
126. Damage Assessment and Health Monitoring of a Box Girder PC Bridge. The Second International Workshop on Advanced Smart Materials and Smart Structures Technology. Gyeongju, Korea, on July 21, 2005. **Keynote Lecture**. Techno-Press, Edited by C.B. Yun and B. Spencer. Pp. 43-60.
127. Health Monitoring of a Box Girder Bridge. Invited Speaker, In Proceedings of the International Symposium on Innovation and Sustainability of Structures in Civil Engineering, Nanjing, China, November 20. 2005.
128. Interdigitated PVDF Transducer for Flaw Detection, *Proceedings of SPIE 11th Annual International Symposium on Smart Structures and Materials*, 26 February-2 March, 2006, San Diego. With H. Guo.
129. Characterization of a Nano-Well Structured Sensor for Hydrogen Detection at Room Temperature, In Proceedings of 3rd International Workshops on Advanced Smart Materials and Smart Structures Technology, 29-30 May, 2006. With G. Hua and E. Indacochea. Tahoe, NV.
130. Novel Application of a Magnetoelastic Sensor as a NDE Tool to Detect and Monitor Corrosion in Structural Steels. *Proceedings of SPIE 11th Annual International Symposium on Smart Structures and Materials*, 26 February-2 March, 2006, San Diego. With E. Indacochea.
131. Smart Cables for Cable-Stayed Bridge. In Proceedings of the US-Korea Workshop on Smart Structures Technology for Steel Structures, 16-18 Nov. 2006, Seoul, Korea. With G. Wang and K. Rim. Pp. 25-32. Invited paper.

132. Long Term Health Monitoring of Post-tensioning Box Girder Bridges. In proceeding of The US-Taiwan Workshop on Smart Sensors and Health Monitoring, 12-14 Oct. 2006, Taipei, Taiwan. Invited paper.
133. Long Term Health Monitoring for Bridges, **Keynote Lecture**. In proceedings of SMIS world conference. Chongqing, P. R. China. May, 2007.
134. Sensor Enriched Infrastructure System, in the proceeding of US-Japan Workshop on Advanced Sensor Technologies for Safe and Secure Societies and better quality of Life. **Keynote Lecture**, Tokyo, Japan, July 20-23, 2007.
135. The Detection of Hydrogen with a Nanotube Structured Sensor, SPIE 12th Annual International Symposium on Smart Structures and Materials, San Diego, CA. March 19-22, 2007, vol. 6529. with Hua Gu.
136. Long Term Health Monitoring Systems for Bridges, SPIE Homeland Security Conference, March 19-22, 2007, San Diego.

Not Updated after March 2007

Invited Lectures , Keynote Lecture and Seminar(Trips Paid by Sponsor)

1. Structural Monitoring Systems for High-Speed Vibrations, Workshop on effect of high-speed vibration on structure and equipment, April 30-May 1, 1998, Taiwan, Taiwan. Keynote Lecture.
2. Monitoring of Cable Forces Using Magneto-Elastic Sensors, 2nd U. S. -China Symposium workshop on Recent Developments and Future trends of computational mechanics in structural engineering, May 25-28,1998, Dalian, PRC. Keynote Lecture.
3. Numerical Simulation of Failures of Quasi-Brittle Materials, International Workshop on Fracture Mechanics and Acoustical Emission in Concrete, Oct. 18-19, 1998, Kumamoto, Japan. Keynote Lecture.
4. Advanced Monitoring Systems for Large Structural Systems, NATO Advanced workshop on smart Structures-requirements and Potential Applications in Mechanical and Civil Engineering, June 16-19, 1998, Poland. Keynote Lecture.
5. Wireless Sensor Technology for Infrastructure Monitoring, Keisoku Research Consultant Co. Jan. 29, 1999, Tokyo, Japan. Invited Seminar.
6. Monitoring and Modeling of a Prestressed Segmental Box Bridges, Workshop on Failure Prevention and Nondestructive Evaluation of Infrastructure, Korea Research Institute of Standards and Science, Jan. 22-23, 1999, Seoul, Korea. Keynote Lecture.
7. Advanced Monitoring Systems for Long Span Bridges, Hyundai Information Technology Co. Industrial Automation R & D Team, Jan. 23, 1999, Seoul, Korea. Invited Lecture.
8. NSF-CERF Joint Collaborations Forum, Nov 10-11, 1998, The Development of a Wireless PVDF Strain Sensor. Invited Inventor.
9. Monitoring Systems for Long Span Bridges, Illinois Institute of Technology, Chicago, IL, Feb. 26,1999. Invited Seminar.

10. Asymptotic Bias Correction for a Probabilistic Neural Network for Structural Health Monitoring, The Second Workshop on Structural Health Monitoring, Stanford University, CA, USA, Sep. 8-10, 1999. Invited Lecture.
11. Monitoring and Modeling of a Prestressed segmental Box Girder Bridge, US-Korea Joint Workshop on Infrastructure and Seismic Engineering, Seoul, Korea. Aug. 24-26, 1999. Invited Lecture.
12. Damage Assessment of a Post-tensioned Segmental Concrete Bridge Using Modal Testing Data, International Workshop on Advanced Technology in Structural Engineering, Oct. 18-20, 1999, Kunming, P. R. China. Invited Lecture.
13. The Monitoring and Damage Assessment of Concrete Structures, Korea Electric Power Research Institute, Chounju, Korea, Aug. 27, 1999, Invited Lecture.
14. Advancement in Bridge Technology, Transportation Research Institute, Nanjing, China, Oct. 21-23, 1999. Invited Lecture.
15. Monitoring of Cable Force Using Magneto Elastic Sensor Technology, Keisoku Research Consultant Co. Tokyo, Japan, Invited Lecture, Aug. 16-19, 1999. Invited Lecture.
16. Sensor Technology for Infrastructure Monitoring, Workshop on Smart Structures in Tsukuba, Japan, 6-8, January, 2000. Invited Lecture.
17. Stress Monitoring of Cables Using EM Sensor, Department of Civil Engineering, University of Tokyo, Jan. 11, 2000. Invited Seminar.
18. Application of EM Sensor on the Stress Measurement of Nanjing Second Yungtze River Cable-Stayed Bridge. Jan.13, 2000. Nanjing, China. Invited Presentation.
19. A New Magnetoelastic Stress/ Corrosion Sensor for Cables in Cable-Stayed Bridges Using Measurement of the Anhysteresis Curve. The Second Workshop on Advanced Technologies in Urban Earthquake Disaster Mitigation, DPRI, Kyoto University, Japan. July 11-13, 2000. Invited Lecture.
20. Health Monitoring of Long Span Bridges, Desirable/Novel Technologies, Invited Speaker, Session Chair and Moderator; University of California, Irvine, 9-10 March 2001.
21. Health Assessment and Monitoring of Large Structures, Daejeon Disaster Prevention Institute. Daejeon, S. Korea. Invited Lecture. Nov. 2001.
22. EM Sensor Technology & Applications in Steel Cables. Korea Research Institute of Standards and Science, Daejeon, S. Korea. Invited Lecture. Nov. 2001
23. Stress and Corrosion Sensors for Large Steel Cables, Korea Concrete Institute & ICES Co. Ltd. Seoul, S. Korea. Invited Lecture. Nov. 2001.
24. PVDF Sensor for Infrastructure Monitoring, Beijing Polytechnic University, Beijing, China. Dec. 2001. Invited Lecture.
25. Measurements of stress for Cables in Nanjing Cable-Stayed Bridge, Institute of Earthquake Engineering, China Academy of Building Research, Beijing, China, Dec. 2001. Invited Lecture.
26. Sensor Technology and Monitoring System for Large Structures, Hong Kong Highways Department Structures Division, Kowloon, Hong Kong. Dec. 2001. Invited Lecture.
27. Monitoring of Cable Force Using Magneto Elastic Sensor Technology, Keisoku Research Consultant Co. Hiroshima, Japan, Invited Lecture, Jan.14-17. 2002. Invited Lecture.
28. Advanced Monitoring Systems for Large Structures. Workshop on Cooperative US-Europe Research in Sensors and Smart Structures, Somma Lombardo, Italy, April 12-13, 2002. Invited Lecture.

29. Failure Mechanisms of Quasi-Brittle Materials- Experimental Observations and Computer Simulations. The Sino-US Joint Symposium on Multi-Scale Analysis in Material Sciences and Engineering, June 17-20, 2002; Beijing, China. Workshop Chairman. Keynote Lecture.
30. National Workshop on Future Sensing Systems, Lake Tahoe, CA. Aug. 26-28, 2003.
31. The US-Korea Workshop on Smart Structural systems, Busan, Korea, 23-24 August, 2002. Invited Lecture and Session Chair .
32. Smart Health Monitoring System of a Prestressed Box Girder Bridge. ICANCEER 2002, Hong Kong, Aug. 17-18. 2002. Invited Lecture.
33. Sensor Technology and Damage Assessment of Concrete Structures. FIB Congress, Osaka, Japan, 13-19, Oct. 2002. Keynote Speaker.
34. Magnetoelastic Corrosion Sensing of Steel Cables. Workshop on Smart Structural Systems-US-Japan Cooperative Research Programs on Smart Structural Systems and Urban Earthquake Disaster Mitigation. Invited Lecture, Oct. 18, 2002. BRI, Tsukuba, Japan.
35. Recommendations for Intelligent Bridge Monitoring Systems. Proceedings of International Symposium on Diagnosis, Treatment and regeneration for Sustainable Urban Systems, Invited Lectures, March 13-14, 2003, Ibaraki, Japan.
36. Intelligent Bridge Monitoring Systems Workshop, Monitoring System Architecture and Temperature Compensated Bootstrap Analysis, Invited Lecture, March 7-8, 2003. San Diego, CA.
37. Magnetoelastic Method of Stress and Corrosion Monitoring in Steel Tendons and Cable. Invited Seminar April 4, 2003. University of California, Irvine. CA.
38. Magnetoelastic Method of Stress and Corrosion Monitoring in Steel Tendons and Cable. Invited Lecture. May 9, 2003. University of Notre Dame. South Bent, IN.
39. Measurement of stresses of very large cables. First International Conference on Structural Health Monitoring and Intelligent Infrastructure (SHMII-1'2003), Tokyo, Japan, November 13-15, 2003. Invited speaker.
40. Residual Stresses and Failure of Silicon Nitride-to-Stainless Steel Braze Joints. AIT-NSF Workshop on Nano, Material, Continuum and Computational Mechanics, 11-12 Dec. 2003, AIT Thailand. Invited speaker.
41. Application of EM Stress Sensors in Large Steel Cables. The US-Korea Joint Workshop on Smart Structures Technologies, Sep. 2-4, 2004 Seoul Korea. Invited speaker.
42. Application of EM Stress Sensors in Large Steel Cables. The International Conference on Earthquake Engineering. 19-20 Oct. 2004, Nanjing, China. Invited speaker.
43. Application of EM stress sensors in Large Steel Cables, North American Euro-Pacific Workshop on Sensing Issues in Civil Structural Health Monitoring, Nov. 10-13, 2004, Invited speaker.
44. Structural Health Monitoring System Application in Japan, North American Euro-Pacific Workshop on Sensing Issues in Civil Structural Health Monitoring, Nov. 10-13, 2004. Invited speaker.
45. Advanced Sensor Technologies for Civil Infrastructure Application, US-India Workshop on Smart Structure Technologies. Dec. 19-22, Bombay, India. Invited speaker.
46. Health Monitoring of Box Girder PC bridge. March 30, 2005. College of Engineering, Florida State University. Invited speaker.
47. Health Monitoring and Advanced Sensor Technology for Civil Infrastructures. April 5, 2005; Civil and Environmental Engineering, Central Florida University. Invited Speaker.

48. Damage Assessment and Monitoring of Post-Tensioning Box Girder Bridges. April 15, 2005; Civil Engineering, University of Maryland, Invited Speaker.
49. Health Monitoring for Design, Construction, and Maintenance of Civil Infrastructures. Sep. 12-14, 2005, Stanford, CA. Keynote Speaker.
50. US-China Collaborative research in Health monitoring and Smart Structures Technologies. Nov. 16-18, 2005; Shenzhen, China. Keynote Speaker.

Not updated after 2005

TEACHING

Courses Taught at UIC

1. Structural Dynamics (CEMM544)
2. Random Vibration (CEMM596)
3. Prestressed Concrete Design (CEMM410)
4. Structural Analysis (CEMM205)
5. Advanced Prestressed Concrete Design (CEMM 510)

Course Taught at Princeton University (Princeton, NJ)

1. Structural Dynamics (5.2/6.0), 1992; 9 students

Courses taught at Northwestern University (Evanston, Illinois)

1. Statics and Dynamics (3.8/4.0) 1984, 32 students
2. Design of Reinforced Concrete Structures Subjected to Dynamic Loads, 1985

SUMMARY OF COURSES TAUGHT

1. Structural Dynamics (UNM, Princeton, UIC)
2. Statics and Dynamics (Northwestern, UNM)
3. Design of Structures under Dynamic Loadings (UNM, Northwestern)
4. Random Vibrations (UNM)
5. Design of Reinforced Concrete Structures (UNM)
6. Prestressed Concrete Design (UNM, UIC)
7. Mechanics of Materials (UNM)
8. Material Science (UNM)
9. Probability and Statistics in Civil Engineering (UNM)
10. Vibration of Elastic Systems (UNM)
11. Advanced Random Vibration (UNM,UIC)
12. Construction Materials and Laboratory (UNM)
13. Advanced Prestressed Concrete Design (UIC)
14. Structural Analysis (UIC)

PUBLIC SERVICES

Professional Services(1997-2003)

1. NSF, Civil and Mechanical Systems, Proposal Reviewer. 1997,1998,1999
2. Journal of Cement and Concrete Composites, Editorial Board Member, Paper Reviewer. 1998,1999.
3. The Second International Workshop on Structural Health Monitoring, Committee Member. 1998
4. NSF Research Planning Workshop for Auto-adaptive Media in Civil Engineering System, Committee member. 8-9 Jan., 1999. West Lafayette, IN.
5. NSF US-JAPAN Collaborative Research on Auto-adaptive Media in Civil Engineering-Application to Structures, Committee Member May 16-17, 1998, Sonoma, CA
6. International Journal of Damage Mechanics, Paper Reviewer. 1998.
7. Experimental Mechanics, SEM Journal, Paper Reviewer. 1998,1999.
8. Transportation Research Board, Committee A2E05, Admixtures and Cementitious Material for Concrete, Member and Paper Reviewer.1998,1999.
9. International Workshop on Fractures and Acoustic Emission in Concrete, Committee Member.
10. International Conference on Fracture Mechanics of Concrete and Concrete Structures, Oct. 12-16, 1998, Gifu, Japan. Committee Member and Paper reviewer.
11. Monitoring and Damage Assessment of Concrete structures, Guest Editor, Cement and Concrete Composites, Elsevier. 1999.
12. Illinois Mathematics and Science Academy (IMSA), Mentorship Dep., Mentor.1998,1999.
13. NSF, International Program, Proposal Reviewer. 1999.
14. Journal of Intelligent Material Systems and Structures, Paper Reviewer. 1998,1999.
15. Hong Kong University Research Council, Proposal reviewer. 1998,1999.
16. Smart Systems for Bridges, SPIE Conference, Program Committee Member. 1999,2000.
17. Intelligent Systems, Infrastructure and Sensors Panel, NSF CAREER program, Panel Reviewer. 1998.
18. International Journal on Structural Engineering and Mechanics, Reviewer.
19. Forum on Health Monitoring of Kiskiwaukee Bridge, Organizer, Nov. 12, 1999, UIC
20. Intelligent Systems, Infrastructure and Sensors Panel, NSF CAREER program, Panel Reviewer. 1999.
21. Journal of Structural Engineering, ASCE, paper reviewer.1999.
22. Us-Japan workshop on Smart Structures and Materials, Committee Co-chairman on Health Monitoring and Damage Assessment. 2000.
23. Journal of Engineering Mechanics, ASCE, Paper reviewer. 2000.
24. Hong Kong Research Grants Council, Proposal Reviewer. 2000.
25. Forum on Health Monitoring of Kiskiwaukee Bridge at UIC, **Organizer and Chair**, Nov. 1999.
26. NSF, SBIR Proposal Reviewer, 2000.
27. NSF, Earthquake Center, Panel reviewer, 2000.
28. Smart Systems for Bridges, 8th Annual SPIE Conference, Program Committee Member. Session Chair.
29. Health Monitoring and Management of Civil Infrastructure Systems, 8th Annual SPIE Conference, Program Committee Member. Session Chair.
30. NSF, CMS, Panel Reviewer, 2001.

31. NSF, CMS, Panel Reviewer, 2002.
32. ASCE, Journal of Structural Engineering, Paper Reviewer. 2001.
33. The Sino-US Symposium on Multi-Scale Analysis in Material Science and Engineering, June 17-20, 2005, Beijing China. Co-Organizer. **Chairman**.
34. Smart Systems for Bridges, SPIE Conference, Program Committee Member. 2001, 2002,2003,2004,2005,2006 and 2007.
35. City University of Hong Kong, Research Office, Proposal Reviewer, 2002, 2003,2004,2005,2006 and 2007.
36. NSF, CMS, Panel Reviewer, 2003, 2004,2005,and 2006.
37. External Examiner for PhD Candidate, The Hong Kong Polytechnic University, 2002, 2004, and 2006.
38. Workshop on Structural Health Monitoring, 2003,2005, and 2007. Stanford, CA. Committee Member.

University Services (1997-2003)

1. **Laboratory Director**, Chairman of Labs Committee, Supervising two Technicians, Managing Expenses for Laboratories. Assessed Maintenance and Replacement Needs and Remodeling of Five Labs.
2. Graduate Committee, Member.
3. Advisory Committee, Member.
4. Material Engineering Committee, Member.
5. Undergraduate Curriculum Committee, Chair.
6. **Director, Graduate Studies, 2001-2002**
7. **Executive Committee Member**, College of Engineering, 2000-2002.
8. EECE Chairman Search Committee Member 2001.

SOCIETY MEMBERSHIP

1. American Society of Civil Engineers
2. Society of Experimental Mechanics
3. British Society of Strain Measurement
4. American Institute of Aeronautics and Astronautics
5. Material Research Society
6. National Society of Professional Engineers
7. International Association for Fracture Mechanics of Concrete

SOCIETY/COMMITTEE MEMBERSHIP (1985-1997)

1. Modal Analysis/Dynamic Systems, Society of Experimental Mechanics
2. Structural Testing Division, Society of Experimental Mechanics
3. Transportation Research Board- A2E05 (Chemical Additions and Admixtures for Concrete)
4. New Mexico Seismic Safety Advisory Council, Department of Public Safety, Governor Office.
5. Associated Editor, Journal of Cement and Concrete Composites
6. Member, Scientific Committee of FRAMCO-3, Association of Fracture Mechanics for Concrete and Concrete Structures

NSF PROPOSAL REVIEW PANELS, JOURNAL REVIEWER

1. National Science Foundation, Division of Engineering Infrastructure Development, Instrumentation and Laboratory Improvement Program, 1986,1988,1990, 1992
2. National Science Foundation, Structural Systems, 1992, 1993,1994
3. Reviewer--Journal of Earthquake Engineering and Structural Dynamics
4. Reviewer--Journal of Soil Dynamics and Earthquake Engineering
5. Reviewer--Transportation Research Board Record
6. Reviewer--Journal of Modal Analysis
7. Reviewer--Journal of Cement and Concrete Composites 1995-1005
8. Reviewer--Journal of Experimental Mechanics 2000-2005
9. Reviewer--National Science Foundation, Earthquake Mitigation, 1994, 1995
10. Reviewer--National Science Foundation, Division of International Program, 1995
11. Reviewer-- Journal of Damage Mechanics
12. Reviewer-- Journal of Structural Engineering and Mechanics, 2000-2005
13. Reviewer—NSF, Sensor Technology, CMS 2003-2006.

Not updated

UNIVERSITY COMMITTEES

1. Research Committee, College of Engineering, 1985-1987.
2. Student Service Committee, College of Engineering, 1986-1988.
3. Chinese Student Association, Advisor, 1986-1988.
4. Public Relation Committee, College of Engineering, 1989-1993
5. Association of Chinese American Scientist and Engineer of NM, President, 1994-1995.

DEPARTMENT COMMITTEES

1. Graduate Student Committee
2. Undergraduate Student Committee
3. Research Committee
4. ASCE Chapter Adviser 1990- 1992

ORGANIZATION OF INTERNATIONAL CONFERENCES

Society of Experimental Mechanics Spring Conference, Albuquerque, NM, Jun 2-6 1990.
Program Chairman.

Co-Chairman, International Conference on Micromechanics of Failure of Quasi-Brittle Materials, Albuquerque, NM, Jun 6-8 1990.

Local Organizer, 14th Biennial conference on mechanical vibration and noise, Albuquerque, NM, Sep. 19-22, 1993

The Sino-US Symposium on Multi-Scale Analysis in Material Science and Engineering, June 17-20, 2005, Beijing, China. Program **Chairman.**

Forum on Health Monitoring of Kiskiwaukee Bridge at UIC, **Organizer and Chair**, Nov. 1999.

The Asian-Pacific Network of Centers for Research in Smart Structure Technology (ANCRiSST09), Boston, USA, July 29-31, 2009. **Conference Chairman**.

CONSULTING (1987-1997)

New Mexico Engineering Research Institute. Performed research on the measurement of soil concrete interaction stresses. Developed techniques to measure the localization phenomena, Summer, 1986.

Helionetics, Inc. Performed experimental research on determination of dynamic response characteristics of laser-guided communication system, Summer 1986.

New Mexico Engineering Research Institute. Performed equipment fragility analysis for protective structures, Summer, 1987.

Sandia National Laboratories. Performed research on effects of nonlinear structural response on nuclear power plant risk, December 1987.

Los Alamos Research Associates. Performed research on Mechanical and Thermal Properties of Geosafe Offgas Hood Fabric, 1991

Boyle Engineering Inc. Performed the Retrofit Analysis of Highway Bridges for Earthquake Resistance. 1991

Sandia National Labs. Performed the Microstructural Study of Ionic Polymeric Gel Muscles, 1993.

SSangYong Cement Co., Safety Technology Group, South Korea, Technical Advisor, Nondestructive Testing, Damage Assessment, Modal Analysis, Monitoring System for Long-Span Bridges. 1996.

Alliance for Transportation Research, Evaluation of Current Damage Assessment Technologies for Bridges, 1996