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Department of Civil and Environmental Engineering
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EDUCATION

Ph.D. *Applied Mechanics*, University of Rhode Island, Kingston, RI (2000-2004)

Dissertation: “Micromechanical Modeling of the Constitutive and Damage Behavior of Heterogeneous Asphalt Materials”

M.S. *Engineering Mechanics*, Zhejiang University, China (1997 –2000)

Thesis: “Boundary Element Analysis of Fracture Behavior in Transversely Isotropic Piezoelectric Materials”

B.S. *Engineering Mechanics and Metrology*, China Institute of Metrology (China Jiliang University), Hangzhou, China (1993 – 1997)

BACKGROUND

Assistant Professor (08/2010 – present), *Department of Civil and Environmental Engineering*, Michigan Technological University

Research Assistant Professor (03/2008 – 08/2010), *Department of Mechanical Engineering-Engineering Mechanics and Department of Civil and Environmental Engineering*, Michigan Technological University

Research Assistant Professor (02/2006 – 03/2008), *Department of Mechanical Engineering-Engineering Mechanics*, Michigan Technological University

Visiting Assistant Professor (08/2005 – 01/2006), *College of Engineering*, Texas A&M University-Kingsville

Research Associate (08/2004 – 07/2005), *College of Engineering*, Texas A&M University-Kingsville

Graduate Research Assistant (08/2000 – 08/2004), *URI Transportation Center and Department of Mechanical Engineering and Applied Mechanics*, University of Rhode Island

CERTIFICATES AND TRAINING

Argonne National Laboratory Computing Training, the Transportation Research and Analysis Computing Center of Argonne National Laboratory, Chicago, November 2008

Professor Training Courses in Asphalt Technology, National Center for Asphalt Technology, Auburn University, Alabama, June 20-29, 2006

ACBM/NIST Computer Modeling Workshop, the Center for Advanced Cement Based Materials (ACBM) and National Institute of Standards and Technology (NIST), Gaithersburg, Maryland, 2004 & 2011

TECHNICAL PUBLICATIONS

Published Journal Papers (45)

(Note: underlined are students under my supervision)

1. Yao, H., **Dai, Q.** and You, Z. (2015) “Molecular Dynamics Simulation of Physicochemical Properties of Asphalt Model”, *Fuel*, Elsevier, accepted in September 2015.
2. Diab, A., M. Yousef Mohassab-Ahmed, Prisbrey, K., **Dai, Q.**, You, Z., and A. M.Wahaballa (2015), “Do Regular- and Nano-sized Hydrated Lime have different Mechanisms in Asphalt?”, *International Journal of Pavement Research and Technology*, 8(5):363-369.
3. Larson, K., Clark, A., Appel A., **Dai, Q.**, He, H. and Zygmunt, S., (2015) “Surface-Dependence of Interfacial Binding Strength between Zinc Oxide and Graphene”, *Royal Society of Chemistry (RSC) Advances*, Vol. 5, 65719-65724, DOI: 10.1039/C5RA13048D
4. Sun, X., Zhang, B., **Dai, Q.** and Yu, X. (2015) “Investigation of Internal Curing Effects on Microstructure and Permeability of Interface Transition Zones in Cement Mortar with SEM Imaging, Transport Simulation and Hydration Modeling Techniques”, *Construction and Building Materials*, Elsevier, Vol. 76, 366–379.
5. Yang, X., **Dai, Q.**, You, Z., Wang, Z. (2014) “Integrated Experimental-Numerical Approach for Estimating Asphalt Mixture Induction Healing Level through Discrete Element Modeling of a Single-Edge Notched Beam Test”, *ASCE Journal of Materials in Civil Engineering*, Vol. 27(9), 10.1061/(ASCE)MT.1943-5533.0001231.
6. Lemmens, R. J., **Dai, Q.**, Meng, D.D. (2014), “Side-Groove Influenced Parameters for Determining Fracture Toughness of Self-Healing Composites Using a Tapered Double Cantilever Beam Specimen”, *Journal of Theoretical and Applied Fracture Mechanics*, Elsevier, Vol. 74, 23–29
7. Sun, X., **Dai, Q.** and Ng, K. (2014) “Computational Investigation of Pore Permeability and Connectivity from Transmission X-Ray Microscope Images of a Cement Paste Specimen”, *Construction and Building Materials*, Elsevier, Vol. 68, 15, 240-251.
8. **Dai, Q.** and Ng, K. (2014). “2D cohesive zone modeling of crack development in cementitious digital samples with microstructure characterization”, *Construction and Building Materials*, Elsevier, Vol. 54, 15, 584–595.
9. Ng, K. and **Dai, Q.** (2014) “Numerical Investigation of Internal Frost Damage of Digital Cement Paste Samples with Cohesive Zone Modeling and SEM Microstructure Characterization”, *Construction and Building Materials*, Elsevier, Vol. 50(15), 266–275.
10. Yang X., You, Z, **Dai, Q.**, Mills-Beale, J. (2014) “Mechanical performance of asphalt mixtures modified by bio-oils derived from waste wood resources”, *Construction and Building Materials*, Elsevier, Vol. 51(31), 424-431.
11. **Dai, Q.** and Ng, K. (2014). “Transmission X-Ray Microscope Nanoscale Characterization and 3D Micromechanical Modeling of Internal Frost Damage in Cement Paste.” the Special Issue on: Mechanics of Nanocomposites and Nanostructures, *ASCE Journal of Nanomechanics and Micromechanics*, Vol. 4(1), A4013005.
12. Ng, K., Sun, Y., **Dai, Q.**, and Yu, X. (2014) "Investigation of Internal Frost Damage in Cementitious Materials with Micromechanics Analysis, SEM Imaging and Ultrasonic Wave Scattering Techniques," *Construction and Building Materials*, Elsevier, Vol. 50(15), 478–485.
13. **Dai, Q.**, Wang, Z. and Mohd Hasan, M. (2013) “Investigation of Induction Healing Effects on Electrically Conductive Asphalt Mastic and Asphalt Concrete Beam through Fracture-Healing Tests,” *Construction and Building Materials*, Elsevier, Vol. 49, 729–737.
14. Yang, X. You, Z., **Dai, Q.** (2013) “Performance Evaluation of Asphalt Binder Modified by Bio-oil Generated from Waste Wood Resources.” *International Journal of Pavement Research & Technology*, Vol. 6(4), 431-439.

15. **Dai, Q., Ng, K.,** Liu, Y., and Yu, X. (2013) "Investigation of Internal Frost Damage in Concrete with Thermodynamic Analysis, Micro-Damage Modeling and Time-Domain Reflectometry Sensor Measurements." *Journal of Materials in Civil Engineering*, ASCE, Vol. 25(9), 1248–1259, DOI: 10.1061/(ASCE)MT.1943-5533.0000761.
16. **Dai, Q.** and **Ng, K.** (2012) "Investigation of Electromechanical Properties of Piezoelectric Structural Fiber Composites with Micromechanics Analysis and Finite Element Modeling", *Mechanics of Materials*, Elsevier, Vol. 53, 29–46.
<http://dx.doi.org/10.1016/j.mechmat.2012.04.014>.
17. **Dai, Q., Ng, K., Zhou, J.,** Kreiger, E.L. and Ahlborn, T. M. (2012), "Damage Investigation of Single-Edge Notched Beam Tests with Normal Strength Concrete and Ultra High Performance Concrete Specimens using Acoustic Emission Techniques," *Construction and Building Materials*, Elsevier, Vol. 31, 231-242.
18. **Ng, K.** and **Dai, Q.** (2012), "Tailored Extended Finite-Element Model for Predicting Crack Propagation and Fracture Properties within Idealized and Digital Cementitious Material Samples," *Journal of Engineering Mechanics*, ASCE, Vol. 138 (1), 89-100,
http://ascelibrary.org/emo/resource/1/jenmdt/v138/i1/p89_s1.
19. **Ng, K.** and **Dai, Q.** (2011), "Investigation of Fracture Behavior of Heterogeneous Infrastructure Materials with Extended-Finite-Element Method and Image Analysis," *Journal of Materials in Civil Engineering*, ASCE, Vol. 23 (12), 1662-1671,
http://ascelibrary.org/mto/resource/1/jmcee7/v23/i12/p1662_s1.
20. **Dai, Q.,** Yu, X., **Ng, K.** and Liu, Z. (2011), "Development of Micromechanics Models and Innovative Sensor Technologies to Evaluate Internal-Frost Damage of Concrete," *Journal of the Transportation Research Board*, National Academies, No. 2240, 50-58.
21. **Dai, Q.** (2011), "A Three-Dimensional Micromechanical Finite Element Network Model for Damage-Coupled Elastic Behavior of Stone-Based Composite Materials," *Journal of Engineering Mechanics*, ASCE, Vol. 137(6), 410-421, DOI:10.1061/(ASCE)EM.1943-7889.0000239.
22. Liu, Y., You, Z., **Dai, Q.,** and Mills-Beale, J. (2011). "Review of advances in understanding impacts of mix composition characteristics on asphalt concrete (AC) mechanics." *International Journal of Pavement Engineering*, Vol. 12 (4), 385-405.
23. You, Z., Liu, Y., and **Dai, Q.** (2011), "Three-dimensional Microstructural-based Discrete Element Viscoelastic Modeling of Creep Compliance Tests for Asphalt Mixtures." *Journal of Materials in Civil Engineering*, ASCE, Vol. 23 (1), 79-87.
24. **Dai, Q.** (2010), "Two- and Three-Dimensional Micromechanical Viscoelastic Finite Element Modeling of Stone-Based Materials with X-Ray Computed Tomography Images," *Construction & Building Materials*, Elsevier, Vol. 25, 1102-1114.
25. You, Z., Mills-Beale, J., Foley, J. M., Roy, S., Odegard, G. M., **Dai, Q.,** and Goh, S. W. (2010). "Nanoclay-modified asphalt materials: Preparation and characterization." *Construction and Building Materials*, Vol. 25, 1072-1078.
26. **Dai, Q.** (2010), "Micromechanical Viscoelasto-Plastic Models and Finite Element Implementation for Rate-Independent and Rate-Dependent Permanent Deformation of Stone-Based Materials," *International Journal for Numerical and Analytical Methods in Geomechanics*, Wiley InterScience, Vol. 34 (13), 1321-1345.
27. **Dai, Q.** (2010), "Prediction of Dynamic Modulus and Phase Angle of Stone-Based Composites using Micromechanical Finite Element Approach," *Journal of Material in Civil Engineering*, ASCE, Vol. 22 (6), 618-627.

28. You, Z, Adhikari, S., and **Dai, Q.** (2010), "Air void effect on an idealised asphalt mixture using two-dimensional and three-dimensional discrete element modelling approach." *International Journal of Pavement Engineering*, Vol. 11, No. 5, 381–391.
29. **Dai, Q.** and You, Z. (2009), "Micromechanical Finite Element Framework for Predicting Viscoelastic Properties of Heterogeneous Asphalt Mixtures," *Materials and Structures*, Springer Netherlands, Vol. 41 (6), 1025-1037, ISSN: 1359-5997 (Print) 1871-6873 (Online), Online at <http://www.springerlink.com/content/6272035711512866>.
30. You, Z., Adhikari, S., Masad, E., and **Dai, Q.** (2009), "Microstructural and Micromechanical Properties of Field and Lab-Compacted Asphalt Mixtures," *Journal of Association of Asphalt Paving Technologists* (AAPT), Vol. 78, 279-316.
31. Liu, Y., **Dai, Q.**, You (2009), "Development of a Viscoelastic Model for Discrete Element Simulation of Asphalt Mixtures," *Journal of Engineering Mechanics*, ASCE, Vol. 135 (4), 324-333.
32. You, Z., Adhikari, S., and **Dai, Q.** (2009), "Air Void Effect on An Idealized Asphalt Mixture Using a Two-Dimensional and Three-Dimensional Discrete Element Modeling Approach," *International Journal of Pavement Engineering*, Vol. 11 (5), 381-391.
33. You, Z., Mills-Beale, J., Williams, R.C., and **Dai, Q.** (2009), "Measuring the Specific Gravities of Fine Aggregates in Michigan: An Automated Procedure," *International Journal of Pavement Research and Technology*, Vol. 2 (2), 37-50, ISSN 1996-6814.
34. Mills-Beale, J., You, Z., Williams, R.C., and **Dai, Q.** (2009), "Determining the Specific Gravities of Coarse Aggregates in Michigan Utilizing Vacuum Saturation Approach," *Construction & Building Materials*, Elsevier, Vol. 23 (3), 1316-1322.
35. You, Z., Adhikari, S., and **Dai, Q.** (2008), "Three-Dimensional Discrete Element Models for Asphalt Mixtures," *Journal of Engineering Mechanics*, ASCE, Vol. 134 (12), 1053-1063.
36. **Dai, Q.** and You, Z. (2007) "Prediction of Creep Stiffness of Asphalt Mixture with Micromechanical Finite Element and Discrete Element Methods," *Journal of Engineering Mechanics*, ASCE, Vol. 133 (2), 163-173.
37. You, Z. and **Dai, Q.** (2007), "A Review of Advances in Micromechanical Modeling of Aggregate-Aggregate Interaction in Asphalt Mixture," *Canadian Journal of Civil Engineering /Rev. can. génie civ.*, Vol. 34(2), 1519-1528, ISSN: 1208-6029.
38. You, Z. and **Dai, Q.**, (2007), "Complex Modulus Predictions of Asphalt Mixtures Using a Micromechanical -Based Finite Element Model," *Canadian Journal of Civil Engineering /Rev. can. génie civ.*, Vol. 34 (12), 1-10, ISSN: 1208-6029.
39. You, Z., and **Dai, Q.** (2007). "Discrete Element Method for Civil Engineering Graduate Students." *International Journal of Applied Management and Technology*, Vol. 5(3), 61-71.
40. **Dai, Q.**, Sadd, M.H. and You, Z. (2006), "A Micromechanical Finite Element Model for Linear and Damage-Coupled Viscoelastic Behavior of Asphalt Mixture," *International Journal for Numerical and Analytical Methods in Geomechanics*, Wiley InterScience, Vol. 30 (11), 1135-1158.
41. **Dai, Q.**, Sadd, M.H., Parameswaran, V. and Shukla, A. (2005), "Prediction of Damage Behaviors in Asphalt Materials using a Finite Element Micromechanical Model and Image Analysis," *Journal of Engineering Mechanics*, ASCE, Vol. 131 (7), 668-677.
42. Sadd, M.H. and **Dai, Q.** (2005), "A Comparison of Micromechanical Modeling of Asphalt Materials Using Finite Elements and Doublet Mechanics," *Mechanics of Materials*, Elsevier, Vol. 37 (6), 641-662.

43. **Dai, Q.**, and Sadd, M.H. (2004), "Parametric Model Study of Microstructure Effects on Damage Behavior of Asphalt Samples," *International Journal of Pavement Engineering*, Vol. 5 (1), 19-30.
44. Sadd, M.H., **Dai, Q.**, Parameswaran, V. and Shukla, A. (2004), "Microstructural Simulation of Asphalt Materials: Modeling and Experimental Studies," *Journal of Materials in Civil Engineering*, ASCE, Vol. 16 (2), 107-115.
45. Sadd, M.H., **Dai, Q.**, Parameswaran, V. and Shukla, A. (2003), "Simulation of Asphalt Materials Using a Finite Element Micromechanical Model with Damage Mechanics," *Journal of Transportation Research Board*, National Academy of Sciences, No.1832, 86-95.

Refereed Conference and Special Publications (20)

(Note: underlined are students under my supervision)

1. **Dai, Q.** and Ng, K. (2010), "An Extended Finite Element Model for Characterization of Concrete Fracture Properties with Compact Tension Tests," *ASCE Engineering Mechanics Special Publication (EMSP) entitled "Pavements and Materials: Testing and Modeling in Multiple Length Scales"*, 159-169.
2. Liu, Y., You, Z., and **Dai, Q.** (2010), "Stiffness of Sand Mastic versus Stiffness of Asphalt Binder Using Three-Dimensional Discrete Element Method," *ASCE Engineering Mechanics Special Publication (EMSP) entitled "Pavements and Materials: Testing and Modeling in Multiple Length Scales"*, 54-65.
3. **Dai, Q.** (2010) "A Microstructure-Based Approach for Simulating Viscoelastic Behaviors of Asphalt Mixtures," *ASCE Geotechnical Special Publication entitled "Asphalt Paving Materials Characterization and Modeling"*, *Proceedings of the GeoShanghai*, 150-161.
4. Adhikari, S., You, Z., **Dai, Q.**, and Liu, Y., (2008) "Investigation of the Air Void Effect on the Asphalt Mixture using 2D and 3D DEM," *Proceedings of First International FLAC/DEM Symposium on Numerical Modeling*, 419-426, ISBN 978-0-9767577-1-9, Minneapolis, MN, USA, August 25 – 27.
5. You, Z., Adhikari, S., and **Dai, Q.** (2008). "DEM Models of Idealized Asphalt Mixtures." In: *Geotechnical Special Publication 182: Pavements and Materials: Characterization, Modeling and Simulation*, Z. You, A. Abbas, and L. Wang, eds., American Society of Civil Engineers (ASCE), 55-62.
6. You, Z., Mills-Beale, J., and **Dai, Q.**, (2008) "Investigation of a New Test Procedure for Measuring the Specific Gravities of Fine Aggregates in Michigan," *Proceedings of 2008 Annual Transportation Research Board Meeting (CD-ROM)*, National Research Council, National Academy of Sciences, Washington, D.C., January 13-17.
7. You, Z., Adhikari, S., and **Dai, Q.** (2008). "Two- and Three-Dimensional Discrete Element Models for Asphalt Mixtures." In: *Geotechnical Special Publication 182: Pavements and Materials: Characterization, Modeling and Simulation*, Z. You, A. Abbas, and L. Wang, eds., American Society of Civil Engineers (ASCE), 117-126.
8. **Dai, Q.** and You, Z., (2007) "Micromechanical Finite Element Models for Micro-Damage and Complex Constitutive Behavior of Asphalt Mixtures," *ASCE publication: Plan, Build, and Manage Transportation Infrastructure in China, Proceedings of the Seventh International Conference of Chinese Transportation Professionals (ICCTP)*, American Society of Civil Engineers, Shanghai, China, May, 867-876.
9. You, Z., Adhikari, S., Goh, S.W., and **Dai, Q.**, (2007) "Dynamic Modulus Test For Mechanistic-Empirical Design For Asphalt Pavements", *ASCE publication: Plan, Build, and Manage Transportation Infrastructure in China, Proceedings of the Seventh International Conference of Chinese Transportation Professionals (ICCTP)*, American Society of Civil Engineers, Shanghai, China, May 841-850.

10. **Dai, Q.** and You, Z. (2007) “A Three-Dimensional Micro-Frame Element Network Model for Damage Behavior of Asphalt Mixtures,” *Geotechnical Special Publication 182: Pavements and Materials: Characterization, Modeling and Simulation*, ASCE, 24-33, ISBN 978-0-7844-0986-2.
11. You, Z., Adhikari, S., and **Dai, Q.**, (2007) “Air Void Effect on an Idealized Asphalt Mixture,” *Geotechnical Special Publication 182: Pavements and Materials: Characterization, Modeling and Simulation*, ASCE, 55-62, ISBN 978-0-7844-0986-2.
12. You, Z., Adhikari, S., and **Dai, Q.**, (2007) “Two- and Three-Dimensional Discrete Element Models for Asphalt Mixtures,” *Geotechnical Special Publication 182: Pavements and Materials: Characterization, Modeling and Simulation*, ASCE, 118-127, ISBN 978-0-7844-0986-2.
13. You, Z., Buttlar, W.G. and **Dai, Q.** (2006) “Aggregate Effect on Asphalt Mixture Properties by Modeling Particle-to-Particle Interaction,” *Geotechnical Special Publication 176: Emerging Methods for the Analysis of Asphalt Pavement Materials and Systems*, ASCE, 14-21.
14. **Dai, Q.** and You, Z. (2006) “Investigation of Linear and Damage-Coupled Viscoelastic Properties of Sustainable Asphalt Mixture Using a Micromechanical Finite Element Approach,” *Geotechnical Special Publication 176: Emerging Methods for the Analysis of Asphalt Pavement Materials and Systems*, ASCE, 22-32.
15. **Dai, Q.** and You, Z. (2006), “Using MATLAB to Solve Engineering Problems for Undergraduates,” Article number 2006-1696, *Proceedings of 113th ASEE Annual Conference & Exposition(CD-ROM)*, American Society for Engineering Education, Chicago, Illinois, June 18-21.
16. You, Z. and **Dai, Q.** (2006), “Feasibility of Virtual Laboratory for Asphalt Mixtures and Pavements,” *Proceedings of 113th ASEE Annual Conference & Exposition(CD-ROM)*, American Society for Engineering Education, Chicago, Illinois, June 18-21.
17. You, Z., **Dai, Q.** and Gurung, B. (2005), “Development of A Finite Element Model for Asphalt Mixture to Predict Compressive Complex Moduli at Low And Intermediate Temperatures,” *Geotechnical Special Publication 146: Asphalt Concrete: Simulation, Modeling, and Experimental Characterization*, ASCE, 21-28.
18. **Dai, Q.**, You, Z. and Sadd, M.H. (2005), “A Micromechanical Viscoelasto-Plastic Model for Asphalt Mixture,” *Geotechnical Special Publication 146: Asphalt Concrete: Simulation, Modeling, and Experimental Characterization*, ASCE, 12-20.
19. Sadd, M.H., **Dai, Q.** (2004), “Micromechanical Modeling of Asphalt Concrete with Applications to Recycled Materials,” *Proceedings of International Workshop on the Use of Recycled Materials in Pavement Design*, Dublin, Ireland, February 20, 97-107, ISBN: 0954694007.
20. Sadd, M.H., Shukla, A., **Dai, Q.** and Parameswaran, V. (2001), “Mechanical Behavior of Recycled Asphalt Materials: Experimental and Theoretical Modeling Results,” *Proceedings of International Conference of Beneficial Use of Recycled Materials in Transportation Applications*, Arlington, VA, 455-465.

Other Conference Publications (not peer refereed or not strictly refereed) (21)

1. Velazquez, A., Swartz, R. A., **Dai, Q.**, Sun X. (2014), “Modeling Stability of Flap-Enabled HAWT Blades Using Spinning Finite Elements,” *Proceedings of 2014 SPIE Smart Structure/NDE Conference*, San Diego, CA, March.
2. **Dai, Q.** and Ng, K. (2013), “Damage Investigation of Single-Edge Notched Beam Tests with Concrete Specimens Using Acoustic Emission Technique,” *Proceedings of 2013 SPIE Smart Structure/NDE Conference*, San Diego, CA, March.

3. **Dai, Q.** and **Ng, K.** (2013), “Micromechanical Analysis and Finite Element Modeling of Electromechanical Properties of Active Piezoelectric Structural Fiber (PSF) Composites,” *Proceedings of 2013 SPIE Smart Structure/NDE Conference*, San Diego, CA, March.
4. **Dai, Q.** and **Ng, K.** (2013), “Integration of Computational Model and SEM Imaging Technology to Investigate Internal Frost Damage in Cementitious Materials,” *Proceedings of 2013 SPIE Smart Structure/NDE Conference*, San Diego, CA, March.
5. **Ng, K.** and **Dai, Q.** (2011), “Micromechanical analysis of constitutive properties of active piezoelectric structural fiber (PSF) composites,” *Proceedings of 2011 SPIE Smart Structure/NDE Conference*, San Diego, CA, March.
6. **Dai, Q.**, Yu, X., **Ng, K.** and Liu, Z. (2011), “Internal Frost Damage in Concrete: Thermodynamic Analysis, Micro-Damage modeling and Time-Domain Reflectometry Sensor Technology,” *Poster presentation and Proceedings of the 91st Annual TRB meeting*.
7. **Dai, Q.**, Yu, X., **Ng, K.** and **Zhou, J.** (2011), “Micromechanics Models and Innovative Sensor Technologies to Evaluate Internal-Frost Damage of Concrete,” *Proceedings of 2011 SPIE Smart Structure/NDE Conference*, San Diego, CA, March.
8. **Dai, Q.**, **Ng, K.** and You, Z. (2011), “Investigation of Internal Frost-Induced Damage of Concrete from Microstructure Aspects,” *Proceedings of NSF CMMI Research and Innovation Conference 2011*, Atlanta, GA, January.
9. Meng, D., **Dai, Q.**, You, Z. and **Lemmens, R.** (2011), “Microfluidic Fabrication of Self-Healing Microcapsules with a Tunable Aspect Ratio for Self-Healing Material Applications,” *NSF CMMI Research and Innovation Conference 2011*, Atlanta, GA, January.
10. **Dai, Q.** and **Ng, K.** (2010), “Micromechanical Analysis of Damping Performance of Piezoelectric Structural Fiber Composites,” *Proceedings of 2010 SPIE Smart Structure/NDE Conference*, San Diego, CA, March.
11. You, Z., Adhikari, S., Liu, Y., **Dai, Q.**, and Van Dam, T. (2008), “A Microstructure-Based Modeling Approach to Analyze Asphalt Pavement Material,” 12 p., *Proceedings of 2008 NSF Engineering Research and Innovation Conference*, Knoxville, Tennessee, Jan. 7-10.
12. You, Z., Mills-Beale, J., Williams, R.C., and **Dai, Q.** (2009), “Investigation of a New Test Procedure for Measuring the Specific Gravities of Fine Aggregates in Michigan,” 15 p. *Proceedings of Transportation Research Board 87th Annual Meeting*, Washington, D.C.
13. **Dai, Q.** (2007), “A Computer-Aided Design Method Course to Improve Students’ Design Skills,” *Proceedings of the 2007 ASEE North Midwest Section Conference(CD-ROM)*, Houghton, MI, September 20-21.
14. You, Z and **Dai, Q.** (2006), “Update on the Discrete Element Method in Engineering Education,” *Proceedings of The 2006 IJME -Intertech, International Conference on Engineering & Technology: Research-Education-Entrepreneurship*, Kean University October 19-21.
15. **Dai, Q.**, Sadd, M.H., and You, Z.(2005), “Micromechanical Modeling of Permanent Deformation of Asphalt Materials,” *2005 Joint ASME/ASCE/SES Conference on Mechanics and Materials (McMAT2005)*, American Society of Civil Engineers, American Society of Mechanical Engineers, and Society of Engineering Science, Baton Rouge, Louisiana, June 1-3.
16. You, Z., PeddiReddy S., Gopal, S. and **Dai, Q.** (2005), “Gradation Analysis Using DEM Simulation,” *2005 Joint ASME/ASCE/SES Conference on Mechanics and Materials (McMAT2005)*, American Society of Civil Engineers, the American Society of Mechanical Engineers, American Society of Mechanical Engineers, and Society of Engineering Science, Baton Rouge, Louisiana, June 1-3.

17. You, Z, **Dai, Q.**, Hu, X. and Wang, B. (2005), “Advances in Micromechanical Modeling of Asphalt Mixture,” *Proceedings of the 5th International Conference of Transportation Professionals*, ISBN: 7-144-05585-4, China Communications Press, Xi’an, China, 276-289
18. **Dai, Q.** and Sadd, M.H. (2004), “Micromechanical Modeling of Damage-Coupled Viscoelastic Behavior of Asphalt Materials,” *Proceedings of 17th ASCE Engineering Mechanics Conference*, University of Delaware, Newark, DE, June 13-16.
19. Sadd, M.H., **Dai, Q.** (2004), “On the Use of Doublet Mechanics for Micromechanical Modeling of Asphalt Materials,” *Proceedings of 17th ASCE Engineering Mechanics Conference*, Newark, June 13-16.
20. **Dai, Q.** and Sadd, M.H. (2003), “Micromechanical Simulation of Asphalt Samples Using a Finite Element Network Model,” *Proceedings of 16th ASCE Engineering Mechanics Conference*, Seattle, July 16-18.
21. Sadd, M.H., **Dai, Q.**, Parameswaran, V. and Shukla, A. (2002), “Microstructural Simulation of Asphalt Materials: Modeling and Experimental Verification,” *Proceedings of 15th ASCE Engineering Mechanics Conference*, University of Columbia, New York, June 2-5.

Technical Reports (10)

1. **Dai, Q.**, Meng, D., Lemmens, R. and You, Z. (2014), “Microfluidic Fabrication of Self-Healing Microfibers for Composite Construction Materials”, *Final Report*, U.S. National Science Foundation (NSF), July.
2. **Dai, Q.** and Ng, K. (2013), “Understanding Mechanism of Internal Frost-Induced Damage of Concrete from Microstructure Aspects”, *Final Report*, U.S. National Science Foundation (NSF), June.
3. You, Z., Yang, X., Mills-Beale, J., and **Dai, Q.** (2013), “Alternative Materials for Sustainable Transportation”, *Final Report*, Michigan Department of Transportation, June.
4. You, Z., Yang, X., and **Dai, Q.** (2012), “A Microstructure-Based Modeling Approach to Characterize Asphalt Materials”, *Final Report*, U.S. National Science Foundation (NSF), October 2012.
5. You, Z, Goh, S., and **Dai, Q.** (2011), “Laboratory Evaluation of Warm Mix Asphalt”, *Final Report*, Michigan Department of Transportation, September.
6. You, Z, Mills-Beale, J., Williams, R.C., and **Dai, Q.** (2009), “Development of New Test Procedure for Measuring Fine and Coarse Aggregate Specific Gravity”, *Final Report*, Michigan Department of Transportation, December.
7. Sadd, M.H., Shukla, A., Tekalur, S. A., and **Dai, Q.** (2005), “Mechanical Behavior of Recycled Asphalt Materials under Dynamic Loading Conditions,” *Final Report of University of Rhode Island-Transportation Center Project No. 536186*, March, 81.
8. Sadd, M.H., Parameswaran, V. Shukla, A., and **Dai, Q.** (2004), “Effect of Microstructure on the Static and Dynamic Behavior of Recycled Asphalt Materials,” *Final Report of University of Rhode Island-Transportation Center Project No. 536164*, February, 39.
9. Sadd, M.H. and **Dai, Q.** (2002), “Effect of Microstructure on the Static and Dynamic Behavior of Recycled Asphalt Materials,” *Final Report of University of Rhode Island-Transportation Center Project No. 536138*, July, 75.
10. Sadd, M.H. and **Dai, Q.** (2001), “Effect of Microstructure on the Static and Dynamic Behavior of Recycled Asphalt Materials,” *Final Report of University of Rhode Island-Transportation Center Project No. 536108*, May, 39.

Abstracts Published in Conference Proceedings (14)

1. Sun, X. and **Dai, Q.** (2014), “Wind-Structure Interactions of Flexible Turbine Blade with Plain or External Tailing Edge Flaps”, *2014 Engineering Mechanics Institute at the McMaster University*, Hamilton, Ontario, August 5-8.
2. Sun, X. and **Dai, Q.** (2014), “Investigation of Internal Curing Effects on Microstructure and Permeability of Interface Transition Zones in Cement Mortar with SEM Imaging and Transport Simulation”, *2014 Engineering Mechanics Institute at the McMaster University*, Hamilton, Ontario, August 5-8.
3. **Dai, Q.**, Yang, X. and Wang, Z. (2014), “Investigation of Induction Healing Effects on Electrical Conductive Asphalt Concrete Beams with Digital Imaging Correlation, Fracture-Healing Testing and Microscale Simulation”, *2014 Engineering Mechanics Institute at the McMaster University*, Hamilton, Ontario, August 5-8.
4. Sun, X. and **Dai, Q.** (2013), “Effects of Internal Curing on Permeability of Interface Transition Zone in Cement Mortar,” *2013 Engineering Mechanics Institute at the Northwestern University*, August 4-7.
5. **Dai, Q.** and Wang, Z. (2013), “Investigation of Induction Healing Effects on Electrical Conductive Asphalt Mastic and Asphalt Concrete Beams through Fracture-Healing Tests,” *2013 Engineering Mechanics Institute at the Northwestern University*, August 4-7.
6. **Dai, Q.** and Ng, K. (2010), “Cohesive Fracture Simulation of Micro-Damage Generated within Heterogeneous Infrastructure Materials,” *16th US National Congress of Theoretical and Applied Mechanics*, State College, Pennsylvania, USA, June 27 - July 2.
7. **Dai, Q.** (2010), “Two- And Three-Dimensional Micromechanical Constitutive Modeling of Heterogeneous Infrastructure Materials with X-Ray Computed Tomography Images,” *16th US National Congress of Theoretical and Applied Mechanics*, State College, Pennsylvania, USA, June 27 – July 2.
8. **Dai, Q.** and You, Z. (2008), “Microstructure-Based Finite Element Modeling of Residual Creep Strain of Asphalt Mixtures,” *Inaugural International Conference of the Engineering Mechanics Institute*, Minneapolis, Minnesota, May 18-21.
9. Adhikari, S., You, Z., and **Dai, Q.** (2006), “Finite Element Modeling of the Viscoelastic Behavior of Asphalt Concrete By Considering The Mixture Microstructure,” *The 43rd Annual Technical Meeting of the Society of Engineering Science*, University Park, Pennsylvania, August 13-16.
10. You, Z. and **Dai, Q.** (2006), “Investigation of Aggregate Effect to Asphalt Mixture Properties by Modeling Particle-To-Particle Interaction in Uniaxial Compressive Tests,” *Mechanics of Flexible Pavements session, 15th U.S. National Congress on Theoretical and Applied Mechanics*, University of Colorado at Boulder, June 25-30.
11. **Dai, Q.** and You, Z. (2006), “Prediction of Complex Modulus of Asphalt Mixture with Micromechanical Finite Element and Discrete Element Models,” *Mechanics of Flexible Pavements session, 15th U.S. National Congress on Theoretical and Applied Mechanics*, University of Colorado at Boulder, June 25-30.
12. You, Z. and **Dai, Q.** (2006), “Investigation of Aggregate Effect to Asphalt Mixture Properties by Modeling Particle-To-Particle Interaction in Uniaxial Compressive Tests,” *Mechanics of Flexible Pavements session, 15th U.S. National Congress on Theoretical and Applied Mechanics*, University of Colorado at Boulder, June 25-30.
13. **Dai, Q.** and You, Z. (2005), “Prediction of Creep Stiffness of Asphalt Mixture with Micromechanical Viscoelastic Finite Element Modeling,” *the Eighth U.S. National Congress on Computational Mechanics (USNCCM8)*, Austin, Texas, July 25-27.

14. You, Z. and **Dai, Q.** (2005), "Reflective Crack of Asphalt Concrete Material Based Upon Micromechanical Approach," *Texas Academy of Science 108th Annual Meeting*, University of Texas, Pan-American, Edinburg, Texas, March 3-5.
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TECHNICAL PRESENTATIONS

Invited Seminars (3)

1. A Micromechanical Modeling Approach for Heterogeneous Composites, Invited Seminar, Geotechnical and Material Group, Civil & Environmental Engineering Department, *Louisiana State University*, Baton Rouge, LA, December 2004.
2. Micromechanical Modeling of the Constitutive and Damage Behavior of Heterogeneous Asphalt Materials, Invited Seminar, School of Civil & Environmental Engineering, *Cornell University*, New York, February 10, 2004.
3. Numerical Investigation and Experimental Calibration of Damage-Coupled Constitutive Behaviors in Asphalt Mixtures, Institute of Mechanics, *China Academy of Sciences*, Beijing, China, May 14, 2004.

Seminars (8)

1. Micromechanical Modeling of Heterogeneous Infrastructure Materials with X-Ray Computed Tomography Images, Seminar of Civil and Environmental Engineering Department, *Michigan Technological University*, January 2012
2. Fundamental and Application Aspects of Resilient and Sustainable Civil Engineering Materials, Seminar of Civil and Environmental Engineering Department, *Michigan Technological University*, April 2010
3. Multiscale Modeling of Multi-Phase Pavement Materials, Seminar of Civil and Environmental Engineering Department, *Michigan Technological University*, April 2007
4. Micromechanical FE Modeling Approaches for Constitutive and Damage Behavior of Heterogeneous Cemented Particulate Composites, Graduate Seminar of Mechanical Engineering-Engineering Mechanics Department, *Michigan Technological University*, September 2006.
5. Micromechanical Modeling of the Constitutive and Damage Behavior of Heterogeneous Composites, Department of Mechanical and Industrial Engineering, *Texas A&M University-Kingsville*, August 2005.
6. Micromechanical Modeling of the Damage-Coupled Constitutive Behavior of Asphalt Mixtures and Experimental Calibration, Department of Civil Engineering, *Zhejiang University*, China, May 7, 2004.
7. Microstructural Effects on the Time-Dependent Constitutive and Damage Behaviors of Asphalt Materials, Department of Mechanical Engineering and Applied Mechanics, *China University of Science and Technology*, Hefei, China, May 24, 2004.
8. Prediction of Damage Behaviors in Asphalt Materials using a Finite Element Micromechanical Model and Image Analysis, Transportation Seminar of URI Transportation Center (URI-TC), *University of Rhode Island*, February 23, 2003.

Conference Presentations (31)

1. Case Studies of Sustainable Technologies for Resilient Structural/Pavement Materials and Structural Components, *The 5th IACIP Annual Workshop*, Jan 11th, 2015, Washington, D.C.
2. Multiscale Modeling of Fracture-Healing Performance of Asphalt Mixture System, AFK50(1) Subcommittee Meeting, *The TRB 94th Annual Meeting*, Jan 13th, 2015, Washington, D.C.
3. Wind-Structure Interactions of Flexible Turbine Blade with Plain or External Tailing Edge Flaps, *2014 Engineering Mechanics Institute at the McMaster University*, Hamilton, Ontario, August 5-8, 2014.
4. Investigation of Internal Curing Effects on Microstructure and Permeability of Interface Transition Zones in Cement Mortar with SEM Imaging and Transport Simulation, *2014 Engineering Mechanics Institute at the McMaster University*, Hamilton, Ontario, August 5-8, 2014.
5. Investigation of Induction Healing Effects on Electrical Conductive Asphalt Concrete Beams with Digital Imaging Correlation, Fracture-Healing Testing and Microscale Simulation, *2014 Engineering Mechanics Institute at the McMaster University*, Hamilton, Ontario, August 5-8, 2014.
6. Investigation of Induction Healing Effects on Electrical Conductive Asphalt Mastic and Asphalt Concrete Beams through Fracture-Healing Tests, *2013 Engineering Mechanics Institute at the Northwestern University*, August 4-7, 2013.
7. Damage Investigation of Single-Edge Notched Beam Tests with Concrete Specimens Using Acoustic Emission Technique, *2013 SPIE Smart Structure/NDE Conference*, San Diego, CA, March 2013
8. Integration of Computational Model and SEM Imaging Technology to Investigate Internal Frost Damage in Cementitious Materials, *2013 SPIE Smart Structure/NDE Conference*, San Diego, CA, March 2013
9. Micromechanical Analysis and Finite Element Modeling of Electromechanical Properties of Active Piezoelectric Structural Fiber (PSF) Composites, *2013 SPIE Smart Structure/NDE Conference*, San Diego, CA, March 2013
10. Investigation of Internal Frost Damage in Cementitious Materials, *The Transportation Research Board (TRB) 92th Annual Meeting*, Washington, D.C., January, 2013
11. Micromechanical Viscoelasto-Plastic Modeling of Permanent Deformation of Asphalt Materials, *Engineering Mechanics Institute 2011*, Boston, MA, June 2-4, 2011.
12. Investigation of Fracture Behavior of Pavement Materials with EXtended Finite Element Method and Image Analysis, *Engineering Mechanics Institute 2011*, Boston, MA, June 2-4, 2011.
13. Micromechanical analysis of constitutive properties of active piezoelectric structural fiber (PSF) composites, *2011 SPIE Smart Structure/NDE Conference*, San Diego, CA, March 2011.
14. Micromechanics Models and Innovative Sensor Technologies to Evaluate Internal-Frost Damage of Concrete, *2011 SPIE Smart Structure/NDE Conference*, San Diego, CA, March 2011.
15. Development of Micromechanics Models and Innovative Sensor Technologies to Evaluate Internal-Frost Damage of Concrete, *The Transportation Research Board (TRB) 90th Annual Meeting*, Washington, D.C., January, 2011.
16. An Extended Finite Element Model for Predicting Crack Propagation within Infrastructure Materials, *Engineering Mechanics Institute 2010*, August, 2010.
17. Micromechanical Constitutive Modeling of Asphalt Mixtures with X-Ray Computed Tomography Images, *Engineering Mechanics Institute 2010*, August, 2010.
18. Micromechanical Analysis of Damping Performance of Piezoelectric Structural Fiber Composites, *Proceedings of 2010 SPIE Smart Structure/NDE Conference*, March, 2010.

19. A Computer-Aided Design Method Course to Improve Students' Design Skills, *2007 ASEE North Midwest Section Conference*, Houghton, MI, September 20-21, 2007.
20. A Three-Dimensional Micro-Frame Element Network Model for Damage Behavior of Asphalt Mixtures, *Symposium of Pavement Mechanics and Materials, 18th ASCE Engineering Mechanics Division Conference*, Virginia Tech, Blacksburg, Virginia, June 3-6, 2007.
21. Micromechanical Finite Element Models for Micro-Damage and Complex Constitutive Behavior of Paving Asphalt Mixtures, *The 7th International Conference of Chinese Transportation Professionals*, Shanghai, China, May 21-21, 2007.
22. Prediction of Stiffness/Modulus of Asphalt Mixture with Micromechanical Finite Element and Discrete Element Models, *Professor Training Courses in Asphalt Technology*, NCAT, Auburn University, June 29, 2006.
23. Prediction of Creep Stiffness of Asphalt Mixture with Micromechanical Viscoelastic Finite Element Modeling, *Eighth U.S. National Congress on Computational Mechanics (USNCCM8)*, Austin, Texas, July 25-27, 2005.
24. Micromechanical Modeling of Permanent Deformation of Asphalt Materials, *2005 Joint ASME/ASCE/SES Conference on Mechanics and Materials (McMAT2005)*, Baton Rouge, Louisiana, June 1-3, 2005.
25. Micromechanical Study of Constitutive and Damage Behavior of Asphalt Concrete with a Finite Element Network Model, *15th ACBM/NIST Computer Modeling Workshop, National Institute of Standards and Technology*, Gaithersburg, Maryland, June 22, 2004.
26. Micromechanical Modeling of Damage-Coupled Viscoelastic Behavior of Asphalt Materials, *17th ASCE Engineering Mechanics Conference*, University of Delaware, Newark, June 14, 2004.
27. Micromechanical Simulation of Asphalt Samples Using a Finite Element Network Model, *16th ASCE Engineering Mechanics Conference*, University of Washington, Seattle, July 16, 2003.
28. Damage Behavior Simulation of Asphalt Material Using a Microstructural Finite Element Model, *SEM Graduate Student Symposium*, Worcester Polytechnic Institution, May 1, 2003.
29. Simulation of Asphalt Materials Using a Finite Element Micromechanical Model with Damage Mechanics, *82nd Annual Meeting of the Transportation Research Board (TRB)*, Washington, DC, January 14, 2003.
30. Microstructural Simulation of Asphalt Materials: Modeling and Experimental Verification, *15th ASCE Engineering Mechanics Conference*, University of Columbia, New York, June 2, 2002.
31. Microstructural Simulation of Asphalt Materials: Modeling and Experimental Verification, *SEM Graduate Student Symposium*, Stony Brook, New York, May 6, 2002.

Poster Presentations (9)

1. Investigation of Internal Frost Damage in Cementitious Materials with Micromechanics Analysis, SEM Imaging and Ultrasonic Wave Scattering Techniques, *the 91st Annual Transportation Research Board (TRB) meeting*, 2013.
2. Internal Frost Damage in Concrete: Thermodynamic Analysis, Micro-Damage modeling and Time-Domain Reflectometry Sensor Technology, *the 91st Annual Transportation Research Board (TRB) meeting*, 2012.
3. Collaborative Research on Internal Frost Damage of Concrete for Sustainable Infrastructures, *MTU Sustainable Future Institute*, 2010.
4. Collaborative Research on Internal Frost Damage of Concrete for Sustainable Infrastructures, *MTU Sustainable Future Institute*, 2009.

COMPLETED PROJECT AS PI

Microfluidic Fabrication of Self-Healing Microfibers for Composite Construction Materials

PI: **Q. Dai**

Co-PI: D. Meng, Z. You

Funding Agency: *National Science Foundation (NSF)*

Funded: \$298,921

Total Project Value: \$395,698

Date: 2009-2014

(Note: PI was switched between Drs. Q. Dai and D. Meng in January 2014)

Induction Healing of Asphalt Composites Containing Conductive Fibers

PI: **Q. Dai**

Sponsor: *Michigan Tech Transportation Research Institute*

Funded: \$5,000

Total project value: \$10,000

Date: 2012-2013

REF-Mentor Grant: Integrated Computational and Experimental Approach for infrastructure Materials.

PI: **Q. Dai**

Sponsor: *Michigan Tech Research Excellence Fund*

Funded: \$10,000

Date: 2012-2014

Collaborative Research: Understanding Mechanism of Internal Frost-Induced Damage of Concrete from Microstructure Aspects (collaborate with Dr. Yu at Case Western Reserve University)

PI: **Q. Dai**

Co-PI: Z. You

Funding Agency: *National Science Foundation (NSF)*

Funded: \$190,000

Total Project Value: \$225,000 (estimated)

Date: 2009-2013

Embedded Piezoelectric Structural Fiber Sensor-Actuator network for Passively Dampening Space Structures

PI: **Q. Dai**

Sponsor: *Michigan Space Grant Consortium*

Funded: \$5,000

Total Project Value: \$10,000

Date: 2010-2012

COMPLETED PROJECT AS CO-PI

Alternative Materials for Sustainable Transportation (bio asphalt)

PI: Z. You

CO-PI: **Q. Dai**

Sponsor: *Federal Highway Administration Passes through Michigan Department of Transportation*

Funded: \$299,960

Total project value: \$330,764

Date: 2009-2013

A Microstructure-Based Modeling Approach to Characterize Asphalt Materials, project #0701264

PI: Z. You

CO-PI: **Q. Dai**, T. Van Dam

Funding Agency: *National Science Foundation (NSF)*

Funded: \$173,698

Total project value: \$206,244

Date: 2007-2013

Laboratory Evaluation of Warm Mix Asphalt

PI: Z. You

CO-PI: **Q. Dai**

Sponsor: *Federal Highway Administration Passes through Michigan Department of Transportation*

Funded: \$190,000

Total project value: \$228,100

Date: 2008-2011

Development of New Test Procedures for Measuring Fine and Coarse Aggregate Specific Gravities

PI: Z. You

CO-PI: **Q. Dai**

Sponsor: *Federal Highway Administration Passes through Michigan Department of Transportation*

Funded: \$181,924

Total project value: \$245,597

Date: 2007-2009

AWARDS AND HONORS

- *Invitation to participate in the 2015 NSF CAREER Proposal Writing Workshop held on April 4 - 5, 2015*, hosted by the Northeastern University.
 - *2013 Michigan Tech Research Excellent Fund –Research Seed Grant*, Michigan Technological University, 2013.
 - *Fellowship awarded for attending the NSF Summer Institute Short Course on Energy Manufacturing (June 28-July 1, 2011)*, Northwestern University.
 - *Invitation to participate in the 2011 NSF CAREER Proposal Writing Workshop held on April 4 - 5, 2011*, hosted by the University of Connecticut.
 - *Mini Grant for Instructional Improvement and Innovation*, Michigan Tech Center for Teaching, Learning, and Faculty Development, 2010
 - *Professor Training Scholarship*, the National Center of Asphalt Technology (NCAT) and the National Asphalt Pavement Association (NAPA) Research & Education Foundation, June 2007
 - *University Fellowship*, University of Rhode Island, 2003-2004
 - *URI-Transportation Center Research Travel Grant*, URI Transportation Center, University of Rhode Island, 2002
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TEACHING

Courses Taught (at Michigan Technological University)

- CE4201: Matrix Structural Analysis, fall 2009, 2010, 2011, 2013, 2014 and 2015
- CE5202: Finite Element Analysis, spring 2009, 2010, 2011, 2013, 2014 and 2015
- CE 5920: Independent Study, fall 2011, spring 2012, spring 2014
- CE 4920: Independent Study, spring 2015
- MEEM 5150: Advanced Mechanics of Materials, spring 2008
- MEEM 2110: Statics, spring 2007, 2008 and 2013 and fall 2012
- MEEM4990 – Special Topics in Mechanical Engineering, summer 2007
- MEEM 4405: Introduction to Finite Element Methods, summer 2007, 2009 and 2010
- MEEM 4403: Computer-Aided Design, fall 2006.
Organized and advised students for PACE (Partners for the Advancement of Collaborative Engineering Education) Course Competitions in conjunction with the course of Computer-Aided Design Methods (MEEM 4403) on December 13, 2006. (14 competitions teams and 42 students participated).

ADVISING

Graduate Students (Committee Chair)

PHD students

- Xiao Sun, PHD student, expected to graduate in summer 2016
- Zigeng Wang, PHD student, expected to graduate in spring 2016
- Renee Oats, PHD student, co-advising, expected to graduate in summer 2016
- Hui Yao, PHD student, co-advising, expected to graduate in summer 2016
- Shuaicheng Guo, PHD student, expected to graduate in summer 2018
- Jinlong Hu, PHD student, expected to graduate in summer 2018
- Ryan Lemmens, PHD student, co-advising, graduated in fall 2014
- Kenny Ng, PhD student, graduated in fall 2012

Master students

- Wanbing Bai, MS student, expected to graduate in spring 2017
- Jun Zhou, MS student, graduated in spring, 2011
- Xiao Sun, MS student, graduated in spring, 2014

Undergraduate students

- Lewis Marshall, fall 2015
- Jacob Kurtz, spring, summer and fall 2015
- Wanbing Bai, spring 2015
- Autumn Storteboom, fall 2014, summer and fall 2015
- Derek Waldorf, summer & fall 2014
- Jordan Hoekwater, spring 2012
- Morgan Hansen, summer 2012
- Ubaldo Rodriguez, summer 2012
- Thaddus Waterman, since fall 2009
- Mike Wyzlic, summer 2009
- Benjamin Roskoskey, summer 2009

Graduate Committee Member

- Member of Doctoral Committee (not directly advised students), *Sanjeev Adhikari, Yu Liu, Renee Oats, Julian Mills-Beale, Xu Yang, Mohd Rosli Mohd Hasan, and Benjamin Winter* in Department of Civil and Environmental Engineering, Michigan Tech
 - Member of Doctoral Committee (not directly advised students), *Yang Liu* in Department of Biomedical Engineering, Michigan Tech
 - Member of Master Committee, *Aakash Ahuja, Kevin Mears, Benjamin Winter, Eric Kreiger* in the Department of Civil and Environmental Engineering, Michigan Tech
 - Member of Master Committee, *Pubodee Ratana-arsanarom*, Department of Material Science and Engineering, Michigan Tech
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RESEARCH INTERESTS

- Advanced characterization, simulation and testing of civil engineering materials such as concrete and asphalt materials over nano, micro and macro scales
 - Investigation of heterogeneous infrastructure material properties by linking microstructure, chemophysical interactions and global behaviors
 - Understanding the multi-physical damage mechanism of infrastructure materials from the microstructure and chemo-physical aspects
 - Developing degradation model for service life prediction for heterogeneous civil engineering materials under physical and environmental loadings
 - Integrating advanced neutron and X-ray micron and nano characterization, small scale testing techniques and simulation to study chemo-physical interface adhesion, cohesion and chemophysical properties of binding phase in concrete (such as ice formation, alkali-silica reaction gels and calcium-silica reaction phases) and modified asphalt mixtures (such as conductive graphite and graphene powders or polymer).
- Smart technologies for transportation materials and resilient structures
 - Development of innovative self-healing systems for cementitious or bitumen materials to extend the service life of infrastructures.

- Development of active-material based actuators for smart turbine blade for vibration and load reduction
- Development of ultrasonic scattering techniques for air void size distribution measurement in concrete and asphalt mixtures
- Development of acoustic emission technology for damage detection and damage behavior evaluation in concrete materials and structures
- Sustainable and energy-efficient structural materials
 - Development of new sustainable and environmental-friendly infrastructure materials such as rubber concrete, porous ecological concrete, blended cement with industry and agriculture waste, geopolymer and bio oil asphalt
 - Investigation of energy-efficient or environmental-friendly construction materials such as solar panels, internal curing concrete with light-weight aggregates or other water reservoirs, and recycled construction materials.

PROFESSIONAL SERVICE

Editorship:

- *Associate Editor*, ASCE Journal of Materials in Civil Engineering, since November 2011.
- *Guest editor*, ASCE Journal of Materials in Civil Engineering: I was the sole guest editor for a special issue section entitled, “Mechanics and Models of Pavement Materials.” – published in September 2013. I have invited potential authors to submit papers on advanced material modeling for analysis of pavement distresses, advanced mechanics of pavement materials, numerical techniques for improved design and analysis of pavements, and multiscale and micromechanical modeling to this journal.

Professional Committee Member

- ASCE Associate member and member of Engineering Mechanics Institute
- ASCE Committee Member, Granular Materials Committee, Engineering Mechanics Institute, 2010-present
- ASCE Committee Member, Pavement Mechanics Committee, Engineering Mechanics Institute, 2014-present
- ASCE Committee Member, Bituminous Materials Committee, Construction Institute, 2011-present ASCE Committee Member, Pavement Committee, Geo-Institute, 2011 - present
- ASCE Committee Member, Geophysics Committee, Geo-Institute, 2011 - present
- Secretary and founding member, Asian-American Pavement Engineers Association (AAPEA)

University and Department Committee Member

- University Committee Member, Faculty Distinguished Service Award Committee (2014-2017)
- Department Committee Member, CEE Graduate Research Committee, from fall 2015

Technical Review

Mechanics of Materials, Elsevier; *Computer Methods in Applied Mechanics and Engineering*, Elsevier; *Construction and Building materials*, Elsevier, *Material and Design*, Elsevier, *Engineering Fracture Mechanics*, Elsevier, *International Journal of Solids and Structures*, Elsevier, *Acta Mechanica*, Springer, *International Journal of Pavement Engineering*, Taylor & Francis;

International Journal of Geomechanics, American Society of Civil Engineers (ASCE); *Journal of Materials in Civil Engineering*, ASCE; *Journal of Engineering Mechanics*, ASCE; *Journal of Transportation Engineering*, ASCE; *Canadian Journal of Civil Engineering*; *Geotechnical Special Publication (GSP)*, ASCE; *ASCE GeoFrontier*.

Grant Review

- *NSF review panel, Structure Materials and Mechanics (SMM) program, Hazard Mitigation and Structural Engineering program, Manufacturing Machines and Equipment (MME) Program and SBIR-Construction Material program*
- *Louisiana Board of Regents' Research Competitiveness Subprogram*

Conference Organization

- *Session Chair, 16th US National Congress on Theoretical and Applied Mechanics (USNCTAM), Pennsylvania State University, PA, 2010,*
- *Session Chair, Engineering Mechanics institute 2010 Conference, Los Angeles, 2010, and Engineering Mechanics Institute 2014 Conference, Hamilton, CA.*