

**QINGLI (BARBARA) DAI, PH.D., PROFESSOR**  
Department of Civil, Env. & Geospatial Engineering  
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## **EDUCATION**

**Ph.D. *Applied Mechanics and Mechanical Engineering***, 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***, China Institute of Metrology (China Jiliang University), Hangzhou, China (1993 – 1997)

## **BACKGROUND**

**Professor** (08/2019-present), *Department of Civil and Environmental Engineering, Michigan Technological University*

**Associate Professor** (08/2016-08/2019), *Department of Civil and Environmental Engineering, Michigan Technological University*

**Visiting Associate Research Scientist** (01/2017-08/2017), Department of Civil Engineering and Engineering Mechanics, Columbia University

**Assistant Professor** (08/2010 – 08/2016), *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*

## **CERTIFICATES AND TRAINING**

The 2020 Virtual Professors' Workshop Co-sponsored by the ACI Foundation and the PCA Education Foundation.

The Portland Cement Association (PCA) Education Foundation Professors' Workshop, Chicago, completed training in 2015 and 2017

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

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

## RESEARCH, SCHOLARSHIP, AND CREATIVE ACTIVITIES

Dr. Dai's scholarship products mainly include 108 published refereed Journal papers in the prestigious international and national journals, 21 referred conference and ASCE special publications, 32 other conference publications and 13 technical reports. Her PhD student Xiao Sun and she received 2017 Best Paper Award for the ASCE Journal of Aerospace Engineering. She also delivered 13 invited seminars, 12 other seminars, 39 conference oral presentation and 19 conference poster presentation, several of which appear in referred conference proceedings or conference abstracts. Her PhD students have also delivered 14 conference presentation. Dr. Dai's scholarship in these areas has been supported by grants on which she was PI and Co-PI that totaled over \$6 million in funding (including cost share), with her net share of over \$3 million. Among these grants are five (three as PI) funded by the National Science Foundation (NSF), and six (two as PI) supported by the Michigan Department of Environmental Quality (MDEQ). Other sponsors of her research program include the Michigan Department of Transportation and Michigan Space Grant Consortium. Dr. Dai and her research group have advanced the fields of nano- and micro-structure and chemo-physical characterization and multi-physical modeling to enhance our fundamental knowledge in the area of civil-engineering material science, and have also engineered solutions to improve material durability and sustainability, as well as structural resilience.

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## TECHNICAL PUBLICATIONS

### Published and Accepted Journal Papers (110)

(Note: underlined are my advised graduate students and dashed underlined are my visiting graduate students)

1. Yunxiang Ma, Qingli Dai, 2022, Lateral Performance Simulation of Conventional CLT Shear Wall and Structure by Equivalent Decomposed Wall Model, ASCE Journal of Structural Engineering,
2. Peifeng Su, Qingli Dai, Miaomiao Li, Yunxiang Ma, Jiaqing Wang, 2022, Investigation of the mechanical and shrinkage properties of plastic-rubber compound modified cement mortar with recycled tire steel fiber, Construction and Building Materials, Volume 334, 127391, <https://doi.org/10.1016/j.conbuildmat.2022.127391>.
3. Hui Yao, Junfu Liu, Mei Xu, Jie Ji, Qingli Dai, Zhanping You, 2022, Discussion on molecular dynamics (MD) simulations of the asphalt materials, Advances in Colloid and Interface Science, Volume 299, 102565, <https://doi.org/10.1016/j.conbuildmat.2022.127391>.
4. Jiaqing Wang, Q Dai, R Si, 2022, Experimental and Numerical Investigation of Fracture Behaviors of Steel Fiber-Reinforced Rubber Self-Compacting Concrete, Journal of Materials in Civil Engineering 34 (1), 04021379.
5. Yunxiang Ma, Xiping Wang, Marshall Begel, Qingli Dai, Yvette Dickinson, Xinfeng Xie, Robert J. Ross, 2021, Flexural and shear performance of CLT panels made from salvaged beetle-killed white spruce, Construction and Building Materials, Volume 302, 4 October 2021, 124381, <https://doi.org/10.1016/j.conbuildmat.2021.124381>
6. Ma, Yunxiang, Munkaila Musah, Ruizhe Si, Qingli Dai, Xinfeng Xie, Xiping Wang, and Robert J. Ross, 2021, "Integrated experimental and numerical study on flexural properties of cross laminated timber made of low-value sugar maple lumber." Construction and Building Materials 280 (2021): 122508. <https://doi.org/10.1016/j.conbuildmat.2021.122508>

7. Ma, Yunxiang, Ruizhe Si, Munkaila Musah, **Qingli Dai**, Xinfeng Xie, Xiping Wang, and Robert J. Ross. 2021 "Mechanical Property Evaluation of Hybrid Mixed-Species CLT Panels with Sugar Maple and White Spruce." *Journal of Materials in Civil Engineering*, 33 (7), 04021171.
8. L You, D Jin, S Guo, J Wang, **Q Dai**, Z You, 2021, Leaching evaluation and performance assessments of asphalt mixtures with recycled cathode ray tube glass: A preliminary study, *Journal of Cleaner Production* 279, 123716, <https://doi.org/10.1016/j.jclepro.2020.123716>
9. Lingyun You, Theodora Spyriounic, **Qingli Dai**, Zhanping You, Ashok Khanal, Experimental and molecular dynamics simulation study on thermal, transport, and rheological properties of asphalt, *Construction and Building Materials*, Volume 265, 30 December 2020, 120358
10. Shuaicheng Guo, Pegah Kord Forooshani, **Qingli Dai**, Bruce P. Lee, Ruizhe Si, Jiaqing Wang Design of pH-responsive SAP polymer for pore solution chemistry regulation and crack sealing in cementitious materials, *Composites Part B: Engineering*, Volume 199, 15 October, 2020, 108262.
11. Ma, Yunxiang, **Qingli Dai**, and Weichiang Pang. "Reliability Assessment of Electrical Grids Subjected to Wind Hazards and Ice Accretion with Concurrent Wind." *Journal of Structural Engineering* 146, no. 7 (2020): 04020134.
12. Lingyun You, **Qingli Dai**, Zhanping You, Xiaodong Zhou, Sarah Washko, 2020, Stability and rheology of asphalt-emulsion under varying acidic and alkaline levels, *Journal of Cleaner Production*, 256, Pages 120417
13. R Si, **Q Dai**, S Guo, J Wang, 2020, Mechanical property, nanopore structure and drying shrinkage of metakaolin-based geopolymer with waste glass powder, *Journal of Cleaner Production*, 242, 118502
14. Wang, J., **Dai, Q.**, Si, R. and Guo, S., 2019, Mechanical, durability, and microstructural properties of macro synthetic Polypropylene (PP) fiber-reinforced rubber concrete. *Journal of Cleaner Production*, 234, 10, Pages 1351-1364
15. S Guo, R Si, **Q Dai**, Z You, Y Ma, J Wang, 2019, A critical review of corrosion development and rust removal techniques on the structural/environmental performance of corroded steel bridges, *Journal of cleaner production*, Volume 233, Pages 126-146
16. L You, D Jin, Z You, **Q Dai**, X Xie, S Washko, S Cepeda, 2019, Laboratory shear bond test for chip-seal under varying environmental and material conditions, *International Journal of Pavement Engineering*, Pages 1-9. <https://doi.org/10.1080/10298436.2019.1662903>
17. Jie Ji, Zhe Wang, Hui Yao, Di Wang, Ran Zhang, Aboelkasim Diab & **Qingli Dai**, 2019, A numerical study on rutting behavior of direct coal liquefaction residue modified asphalt mixture, *Journal of Road Materials and Pavement Design*, Taylor & Francis, 1-15. <https://doi.org/10.1080/14680629.2019.1690029>
18. Si, R., **Dai, Q.** 2019 Mechanical Property, Nanopore Structure and Drying Shrinkage of Metakaolin-based Geopolymer with waste glass powder, *Journal of Cleaner Production*.
19. Gong, F., Guo, S., Chen, S., You, Z., Liu, Y., **Dai, Q.** 2019 "Strength and durability of dry-processed stone matrix asphalt containing cement pre-coated scrap tire rubber particles." *Construction and Building Materials*, Volume 214, 2019, Pages 475-483
20. Yao, H., **Dai, Q.**, You, Z., J Zhang, S Lv, X Xiao. 2019 "Evaluation of contact angle between asphalt binders and aggregates using Molecular Dynamics (MD) method." *Construction and Building Materials* 212, 727-736.
21. Wang, J., Guo, S., **Dai, Q.**, Si, R. and Ma, Y. 2019 "Evaluation of cathode ray tube (CRT) glass concrete with/without surface treatment." *Journal of Cleaner Production* 226 (2019): 85-95.
22. You, L., You, Z., **Dai, Q.**, Xie, X., Washko, S., and Guo, S., 2019. Investigation of adhesion and interface bond strength for pavements underlying chip-seal: Effect of asphalt-aggregate

- combinations and freeze-thaw cycles on chip-seal. *Construction and Building Materials* 203, 322-330
23. Wang, J., Dai, Q., Xie, X., and Guo, S., 2019 Mechanical and durability performance evaluation of crumb rubber-modified epoxy polymer concrete overlays. *Construction and Building Materials*, Volume 203, 10 April 2019, Pages 469-480.
  24. Wang, Z., Li, L., Song, L., Guo, S., and Dai, Q., 2019, High-Frequency Fatigue Performance of Cracked Mortar after Epoxy Grouting Reinforcement, *ASCE International Journal of Geomechanics* 19 (5), 04019035
  25. Sun, X. and Dai, Q., (2018) “Cepstrum-based Operational Modal Analysis of Wind Turbines with and without External Flaps,” *Journal of Renewable and Sustainable Energy* 10, 063303 (2018); <https://doi.org/10.1063/1.5037782>.
  26. Wang, J., Dai, Q., Si, R., and Guo, S., (2018), “Investigation of Properties and Performances of Polyvinyl Alcohol (PVA) Fiber-Reinforced Rubber Concrete,” Elsevier, *Construction and Building Materials*, Volume 193, 30 December 2018, Pages 631-642.
  27. Guo, S., Dai, Q., Si, R. (2018) “Effect of Calcium and Lithium on Alkali-silica reaction kinetics and phase development,” Elsevier, *Cement and Concrete Research*, Volume 115, January 2019, Pages 220-229
  28. Si, R., Dai, Q., Sun, X., (2019), “Numerical and experimental study of internal curing effects on permeability of mortar samples”, *Journal of Engineering Mechanics*, Volume 145 Issue 2 - February 2019. [https://doi.org/10.1061/\(ASCE\)EM.1943-7889.0001561](https://doi.org/10.1061/(ASCE)EM.1943-7889.0001561)
  29. Wang, J., Dai, Q., Guo, S., and Si, R., (2019), “Study on Rubberized Concrete Reinforced with Different Fibers”. *ACI Materials Journal* 116, no 2.
  30. Zhang, R., Dai, Q., You, Z., Wang, H., Peng, C., (2018), “Rheological performance of bio-char modified asphalt with different particle sizes”, *Applied Sciences* 8(9): 1-15. <https://doi.org/10.3390/app8091665>
  31. Si, R., Guo, S., Dai, Q., (2018), “Influence of calcium content on the atomic structure and phase formation of alkali-activated cement binder”, *Wiley Journal of the American Ceramic Society*, 102 (3), 1479-1494
  32. Guo, S., Dai, Q., Chang, L., Hu, Y., Xie, X., Si, R., Wang, J., (2018), “Kinetic Analysis and Thermodynamic Simulation of Alkali-Silica Reaction in Cementitious Materials”, *Wiley Journal of the American Ceramic Society*, 102 (3), 1463-1478
  33. You, L., You Z., Dai, Q., Guo, S., Wang, J., Schultz, M., (2018), “Characteristic of water-foamed asphalt mixture under multiple freeze-thaw cycles: laboratory evaluation”, *ASCE Journal of the Materials in Civil Engineering*, Vol. 30, 11, [https://doi.org/10.1061/\(ASCE\)MT.1943-5533.0002474](https://doi.org/10.1061/(ASCE)MT.1943-5533.0002474)
  34. Wang, Z., Li, L., Guo, S., Dai, Q., (2018), “Nonlinear fatigue damage of cracked cement paste after grouting enhancement”, 2018 *Applied Sciences (Switzerland)*, 8(7), 1105. <https://doi.org/10.3390/app8071105>
  35. You, L., You, Z., Dai, Q. and Zhang, L., (2018), “Assessment of nanoparticles dispersion in asphalt during bubble escaping and bursting: Nano hydrated lime modified foamed asphalt”. Elsevier, *Construction and Building Materials*, 184, pp.391-399. <https://doi.org/10.1016/j.conbuildmat.2018.06.234>
  36. Wang, Z., Guo, S., and Dai, Q., (2018), “Microwave-Healing Performance of Modified Asphalt Mixtures with Flake Graphite and Exfoliated Graphite Nanoplatelet”, *Construction & Building Materials*, Elsevier, Volume 187, 30 October 2018, Pages 865-875. <https://doi.org/10.1016/j.conbuildmat.2018.06.210>

37. Sun, X., Dai, Q., and Bilgen, O., (2018), “Design and Simulation of Macro-Fiber Composite Based Serrated Microflap for Wind Turbine Blade Fatigue Load Reduction”, *IOPscience Materials Research Express*, Volume 5, Number 5, Published 18 May 2018.
38. Guo, S., Hu, J., and Dai, Q., (2018), “A Critical Review on the Performance of Portland Cement Concrete with Recycled Organic Components”, *Journal of Cleaner Production*, Elsevier, Volume 188, 1, July 2018, Pages 92-112. <https://doi.org/10.1016/j.jclepro.2018.03.244>
39. Si, R., Wang, J., Guo, S., Han, S., and Dai, Q., (2018), “Evaluation of Laboratory Performance of Self-Consolidating Concrete with Recycled Tire Rubber”, *Journal of Cleaner Production*, Elsevier, Volume 180, 10 April 2018, Pages 823-831. <https://doi.org/10.1016/j.jclepro.2018.01.180>
40. Sun, X., Faraone, A., Dai, Q., Guo, S., (2018), “A new approach of quantitatively analyzing water states by neutron scattering in hardened cement paste”, *Elsevier Journal of Materials Characterization*, Volume 136, February 2018, Pages 134-143. <https://doi.org/10.1016/j.matchar.2017.12.016>
41. Yao, H., Dai, Q., You, Z., Bick, A., Wang, M., (2018), “Modulus Simulation of Asphalt Binder Models Using Molecular Dynamics (MD) Method”, *Construction & Building Materials*, Elsevier, Volume 162, 20 February 2018, Pages 430-441. <https://doi.org/10.1016/j.conbuildmat.2017.09.106>
42. Guo, S., Dai, Q., Sun, X., Xie, X., (2018), “Neutron scattering measurement of water content and chemical composition of alkali-glass powder reacted gel”, *Elsevier Journal of Materials Characterization*, Volume 136, February 2018, Pages 165-174. <https://doi.org/10.1016/j.matchar.2017.12.014>
43. Guo, S., Dai, Q., Sun, X., Xiao, X., Wang, J., (2018), “Reduced Alkali-Silica Reaction Damage In Recycled Glass Mortar Samples with Supplementary Cementitious Materials”, *Journal of Cleaner Production*, Elsevier, Volume 172, 20 January 2018, Pages 3621-3633. <https://doi.org/10.1016/j.jclepro.2017.11.119>
44. Sun, X., Guo, S., Dai, Q., Xiao, X., (2018), “Microstructure characterization of alkali-glass particle and alkali-glass powder reacted gels with neutron scattering and imaging techniques”, *Elsevier Journal of Materials Characterization*, Volume 131, September 2017, Pages 98-107, <https://doi.org/10.1016/j.matchar.2017.07.006>
45. Sun, X., Tao, J., Li, J., Dai, Q., Yu, X., (2017), “Aeroelastic-Aerodynamic Analysis and Flow Sensor Design for Boundary Layer Velocity Profiles of Wind Turbine Blades with Active External Flaps”, *Smart Structures and Systems*, An International Journal, Vol. 20, No. 3, 311-328, <https://doi.org/10.12989/sss.2017.20.3.311>.
46. Si, R., Guo, S., and Dai, Q., (2017), “Durability Performance of Rubberized Mortar and Concrete with NaOH-Solution Treated Rubber Particles”, *Construction and Building Materials* 153 (2017) pp. 496-505, <https://doi.org/10.1016/j.conbuildmat.2017.07.085>
47. Guo, S., Dai, Q., Wang, Z., Yao, H., (2017), “Rapid Microwave Irradiation Synthesis of Carbon Nanotubes on Graphite Surface and Its Application on Asphalt Reinforcement”, *Journal: Composites Part B: Engineering*, Volume 124, 1 September 2017, Pages 134–143
48. Guo, S., Dai, Q., Sun, X., Xiao, X., (2017), “X-Ray CT Characterization and Fracture Simulation of ASR Damage of Glass Particles in Alkaline Solution and Mortar”, *Theoretical and Applied Fracture Mechanics*, Available online 20 May 2017, <https://doi.org/10.1016/j.tafmec.2017.05.014>
49. Wang, Z. and Dai, Q., Guo, S., (2017), “Laboratory performance evaluation of both flake graphite and exfoliated graphite nanoplatelet modified asphalt composites”, *Construction and*

Building Materials, Elsevier, Volume 149, 15 September 2017, Pages 515-524.  
<https://doi.org/10.1016/j.conbuildmat.2017.05.100>

50. Sun, X., Dai, Q., Menon, M., Ponta, F., (2017), “Design and Simulation of Active External Trailing Edge Flaps for Wind Turbine Blades on Load Reduction”, *Journal of Aerospace Engineering*, ASCE, Vol. 30, Issue 5 (September 2017), [https://doi.org/10.1061/\(ASCE\)AS.1943-5525.0000771](https://doi.org/10.1061/(ASCE)AS.1943-5525.0000771), **2017 Best Paper Award for the ASCE Journal of Aerospace Engineering.**
51. Oats, R., and Dai, Q., (2017), “Improved 2D Digital Image Correlation Method for Displacement and Deflection Measurements of Structural Beams”, *Modern Civil and Structural Engineering*, Volume 1, Number 1, October 2017. DOI: 10.22606/mcse.2017.11002
52. Guo, S., Dai, Q., Sun, X., Sun, Y., Liu, Z., (2017), “Ultrasonic Techniques for Air Void Size Distribution and Property Evaluation in both Early-Age and Hardened Concrete Samples”, *Journal of Applied Sciences*, *Appl. Sci.* 2017, 7(3), 290; doi:10.3390/app7030290.
53. Guo, S., Dai, Q., Si, R., Sun, X., Lu, C., (2017), “Evaluation of properties and performance of rubber-modified concrete for recycling of waste scrap tire”, Volume 148, 1 April 2017, Pages 681–689, *Journal of Cleaner Production*, Elsevier.  
<http://www.sciencedirect.com/science/article/pii/S0959652617302500>
54. Yao, H., Dai, Q., You Z., Bick A., and Wang M., (2017), “Property Analysis of Exfoliated Graphite Nanoplatelets Modified Asphalt Model Using Molecular Dynamics (MD) Method”, *Journal of Applied Sciences* 7(1):43, January 2017, DOI: 10.3390/app7010043
55. Yao, H., Dai, Q., You, Z., (2017), “Investigation of the Asphalt-Aggregate Interaction using Molecular Dynamics”, *Petroleum Science and Technology*, Volume 35, 2017 - Issue 6, <http://www.tandfonline.com/doi/full/10.1080/10916466.2016.1270303>
56. Guo, S., Dai, Q., Hiller, J. (2017), “Investigation on the Freeze-Thaw Damage to the Jointed Plain Concrete Pavement under Different Climate Conditions”, *Frontiers of Structural and Civil Engineering*, Springer, pp 1-12, <https://link.springer.com/article/10.1007/s11709-017-0426-6>.
57. Wang, Z., Dai, Q., Guo, S., Wang, R., Ye, M., Yap, Y., (2017), “Experimental investigation of physical properties and accelerated sunlight-healing performance of flake graphite and exfoliated graphite nanoplatelet modified asphalt materials”, *Construction and Building Materials*, Elsevier, Volume 134, 1 March 2017, Pages 412–423.
58. Wang, Z., Dai, Q., Wang, R., Yang, X., (2017) “Evaluation of Recovered Fracture Strength after Light Healing of Graphite Modified Asphalt Mixtures with Integrated Computational-Experimental Approach,” *Journal of Materials in Civil Engineering*, ASCE, Volume 29 Issue 5 - May 2017, [http://ascelibrary.org/doi/abs/10.1061/\(ASCE\)MT.1943-5533.0001786](http://ascelibrary.org/doi/abs/10.1061/(ASCE)MT.1943-5533.0001786).
59. Wang, Z., Dai, Q., Porter, D., and You, Z., (2016), “Investigation of Microwave Healing Performance of Electrically Conductive Carbon Fiber Modified Asphalt Mixture Beams,” *Construction and Building Materials*, Elsevier, Volume 126, 15 November 2016, Pages 1012–1019
60. Yang, X., You, Z., Wang, Z., and Dai, Q. (2016) “Review on the Heterogeneous Model Reconstruction of Stone-based Composites in Numerical Simulation”, *Construction & Building Materials*, Elsevier, 117, 229-243.
61. Guo, S., Dai, Q., Sun, X.; Sun, Y., (2016), “Ultrasonic Scattering Measurement of Air Voids Distribution in Hardened Concrete Samples”, *Construction & Building Materials*, Elsevier, 113, 415-422.
62. Yao, H., Dai, Q., You, Z., Ye, M. and Yap, Y., (2016), “Rheological properties, low-temperature cracking resistance, and optical performance of exfoliated graphite nanoplatelets modified asphalt binder”, *Construction & Building Materials*, Elsevier, 113, 988-996.

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64. Wang, Z., **Dai, Q.** and Yang, X., (2016), “Integrated Computational-Experimental Approach for Evaluating Recovered Fracture Strength after Induction Healing of Asphalt Concrete Beam Samples”, *Construction & Building Materials*, Elsevier, 106, Pages 700–710
65. Yao, H., **Dai, Q.** and You, Z., (2016), “Molecular Dynamics Simulation of Physicochemical Properties of Asphalt Model”, *Fuel*, Elsevier, 164, Pages 83–93
66. Yao, H., **Dai, Q.** and You, Z., (2015), “Chemo-physical Analysis and Molecular Dynamics (MD) Simulation of Moisture Susceptibility of Nano Hydrated Lime Modified Asphalt Mixtures”, *Construction & Building Materials*, Elsevier, 101, Pages 536–547.
67. Yao, H., **Dai, Q.** and You, Z., (2015), “Fourier Transform Infrared Spectroscopy Characterization of Aging-related Properties of Original and Nano-modified Asphalt Binders”, *Construction & Building Materials*, Elsevier, 101, Pages 1078–1087.
68. Diab, A., M. Yousef Mohassab-Ahmed, Prisbrey, K., **Dai, Q.**, You, Z., and Wahaballa A. M., (2015), “Do Regular- and Nano-sized Hydrated Lime have different Mechanisms in Asphalt?”, *International Journal of Pavement Research and Technology*, 8(5):363-369.
69. 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. <http://pubs.rsc.org/en/Content/ArticleLanding/2015/RA/c5ra13048d#!divAbstract>
70. 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. <https://doi.org/10.1016/j.conbuildmat.2014.12.014>
71. 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.
72. 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, <https://doi.org/10.1016/j.tafmec.2014.06.011>
73. 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. <https://doi.org/10.1016/j.conbuildmat.2014.06.049>
74. **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.
75. 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.

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83. **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.
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### **Book Chapter (1)**

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### **Refereed Conference and ASCE or ACI Special Publications (21)**

(Note: underlined are students under my supervision)

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2. Wang, Z., **Dai, Q.**, You, Z., and Porter, D., (2016), Investigation of Microwave Healing Performance of Electrically Conductive Carbon Fiber Modified Asphalt Mixture Beams, SCMT4, Las Vegas, USA, August 7-11, 2016. (Proceedings Publication and Oral Presentation by **Dai, Q.**)
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2. Guo, S., **Dai, Q.**, Sun, X., Xiao, X., Si, R., (2018), Reduced Alkali-Silica Reaction Damage in Recycled Glass Mortar Samples with SCMs. World Transportation Conference, 2018. (Proceedings Publication and Oral Presentation by Guo, S.)
3. Guo, S., and **Dai, Q.**, (2017), "Characterization of Early Alkali-Silica Reaction in Recycled Glass Mortar Samples With/Without Secondary Cementitious Materials", Transportation Research Congress 2017, China National Convention Center (CNCC), Beijing, PRC, May, 2017. (Proceedings Publication Only)
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  12. **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. (Proceedings Publication and Oral Presentation by **Dai, Q.**)
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  15. **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*. (Proceedings Publication and Poster Presentation)
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  18. 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. (Proceedings Publication and Poster Presentation)

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26. 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. (Proceedings Publication and Oral Presentation by **Dai, Q.**)
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29. **Dai, Q.** and Sadd, M.H., (2003), "Micromechanical Simulation of Asphalt Samples Using a Finite Element Network Model," *Proceedings of 16<sup>th</sup> ASCE Engineering Mechanics Conference*, Seattle, July 16-18. (Proceedings Publication and Oral Presentation by **Dai, Q.**)
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## Abstracts Published (45)

(Abstracts were submitted for the presentation. The oral presentation by myself or my Ph.D. students were indicated)

1. Guo, S., and Dai, Q., (2018), Damage Characterization and Thermodynamic Mechanism Simulation of Alkali-Silica Reaction in Recycled Glass Mortar Samples. *The 8th IACIP Annual Workshop*, Washington, DC, January, 2018. (Oral Presentation by Guo, S.)
2. Wang, J., and Dai, Q., (2018), Polyvinyl Alcohol (PVA) Fiber-Reinforced Rubber Concrete. *The 8th IACIP Annual Workshop*, Washington, DC, January, 2018. (Poster Presentation)
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4. Guo, S., and Dai, Q., (2018), Effect of calcium and lithium on alkali-silica reaction kinetics and phase development, *9th Advances in Cement-Based Materials (Cement 2018)*, State College, PA, July, 2018. (Oral Presentation by Guo, S.)
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15. Guo, S., Dai, Q., and Sun, X., (2016), Chemical Composition Analysis of Alkali-glass Powder Reacted Gel, *7th Advances in Cement-Based Materials (Cements 2016)*, Evanston, IL, July, 2016. (Oral Presentation by Guo, S.)
16. Sun, X., Guo, S., and Dai, Q., (2016), Neutron Scattering Investigation of Water Dynamics in Hardened Cement Paste under Freeze-Thaw Cycles, *7th Advances in Cement-Based Materials (Cements 2016)* in Evanston, IL, July, 2016. (Oral Presentation by Sun, X.)

17. Guo, S., **Dai, Q.**, Sun, X., and Sun, Y., (2016), Ultrasonic Scattering Measurement of Air Void Size Distribution in Early-age and Hardened Concrete Samples, *7th Advances in Cement-Based Materials (Cements 2016)*, Evanston, IL, July, 2016. (Oral Presentation by Guo, S.)
18. Guo, S., Sun, X., and **Dai, Q.**, (2015), Small-angle Neutron Scattering and X-ray Computed Tomography Characterization of Alkali-Glass Particle Reacted Gels, *7th Advances in Cement-Based Materials (Cements 2016)* in Evanston, IL, July, 2016. (Oral Presentation by Guo, S.)
19. Wang, S., Si, R., Guo, S., and **Dai, Q.**, (2017), Property Evaluation and Characterization of Fiber-Reinforced Rubberized Concrete. *2017 ACI Fall Convention*, Anaheim, CA, October, 2017. (Oral Presentation by **Dai, Q.**)
20. Guo, S., and **Dai, Q.**, (2017), ASR Damage Detection and Assessment of Supplementary Cementitious Materials Subjected to Environmental Loadings. *2017 ACI Spring Convention*, Detroit, MI, March, 2017. (Oral Presentation by Guo, S.)
21. Si, R., **Dai, Q.**, and Guo, S., (2017), Experimental Performance of Self-Consolidating Rubberized Concrete. *2017 ACI Spring Convention*, Detroit, MI, March, 2017. (Oral Presentation by Si, R.)
22. Guo, S. and **Dai, Q.**, (2016), “Characterization of Chemical Composition and Microstructure of Synthesized Alkali-Silica Gel with Small-Angle Neutron and X-Ray Scattering”, *2016 Engineering Mechanics Institute and Probabilistic Mechanics & Reliability Conference 2016*, Vanderbilt University, May 22-25. (Oral Presentation by Guo, S.)
23. Sun, X. and **Dai, Q.**, (2016), “Aerodynamic Analysis of Flow-Control Devices for Wind Turbine Applications based on the Trailing-Edge Slotted-Flap Concept”, *2016 Engineering Mechanics Institute and Probabilistic Mechanics & Reliability Conference 2016*, Vanderbilt University, May 22-25. (Oral Presentation by Sun, X.)
24. Yao, H., **Dai, Q.**, You, Z., (2016), “Molecular Dynamics Simulation of Physicochemical Properties of the Asphalt Model”, *2016 Engineering Mechanics Institute and Probabilistic Mechanics & Reliability Conference 2016*, Vanderbilt University, May 22-25. (Oral Presentation by Yao, H.)
25. Guo, S., Dai, Q., Sun, X., (2015), “Ultrasonic Scattering Measurement of Air Void Size Distribution in Hardened Concrete Samples”, *57th Annual Acoustic Emission Working Group Meeting at the UIC Department of Civil and Materials Engineering*, May 13-15, 2015. (Oral Presentation by Guo, S.)
26. Guo, S., Dai, Q., Sun, X., (2015), “Ultrasonic Scattering Measurement of Air Voids Distribution in Early-Stage and Hardened Concrete Samples”, *7th Advances in Cement-Based Materials*, Northwestern University, Evanston, IL, July 20-22, 2015. (Oral Presentation by Guo, S.)
27. Guo, S., Dai, Q., Sun, X., (2015), “Advanced Characterization of Alkali-Silica Reaction (ASR) Gel Development in Specially-Prepared Mortar Specimens with Recycled Glass Particles”, *7th Advances in Cement-Based Materials*, Northwestern University, Evanston, IL, July 20-22, 2015. (Oral Presentation by Guo, S.)
28. 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. (Oral Presentation by **Dai, Q.**)
29. 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. (Oral Presentation by **Dai, Q.**)
30. **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. (Oral Presentation by **Dai, Q.**)



31. 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. (Oral Presentation by **Dai, Q.**)
32. **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. (Oral Presentation by **Dai, Q.**)
33. **Dai, Q.** and Ng, K., (2013), Investigation of Internal Frost Damage in Cementitious Materials, *The Transportation Research Board (TRB) 92th Annual Meeting*, Washington, D.C., January, 2013. (Oral Presentation by **Dai, Q.**)
34. **Dai, Q.**, Sadd, M.H., and You, Z., (2011), "Micromechanical Viscoelasto-Plastic Modeling of Permanent Deformation of Asphalt Materials", *Engineering Mechanics Institute 2011*, Boston, MA, June 2-4, 2011. (Oral Presentation by **Dai, Q.**)
35. **Dai, Q.**, Sadd, M.H., and You, Z., (2011), "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. (Oral Presentation by **Dai, Q.**)
36. **Dai, Q.**, Sadd, M.H., and You, Z., (2011), "An Extended Finite Element Model for Predicting Crack Propagation within Infrastructure Materials", *Engineering Mechanics Institute 2010*, August, 2010. (Oral Presentation by **Dai, Q.**)
37. **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. (Oral Presentation by **Dai, Q.**)
38. **Dai, Q.** and Ng, K., (2010), "Micromechanical Constitutive Modeling of Asphalt Mixtures with X-Ray Computed Tomography Images", *Engineering Mechanics Institute 2010*, August, 2010. (Oral Presentation by **Dai, Q.**)
39. **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. (Oral Presentation by **Dai, Q.**)
40. **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. (Oral Presentation by **Dai, Q.**)
41. 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. (Oral Presentation by **Dai, Q.**)
42. 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. (Oral Presentation by **Dai, Q.**)
43. **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. (Oral Presentation by **Dai, Q.**)
44. **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. (Oral Presentation by **Dai, Q.**)

45. 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. (Oral Presentation by **Dai, Q.**)

### Technical Reports (16)

1. **Dai, Q.**, (2018) "Fiber-reinforced High-performance Rubber Concrete for Concrete Structure Construction and Repair", Michigan Department of Environmental Quality.
2. **Dai, Q.**, (2017) "Incorporating Surface-Treated Rubber Particles into Portland Cement and Geopolymer Concrete to Improve Field Performance", Michigan Department of Environmental Quality.
3. **Dai, Q.**, Ponta, F., Sun, X., (2017), "Collaborative Research: Nexus of Simulation, Sensing and Actuation for Aerodynamic Vibration Reduction of Wind Turbine Blades", Annual Reports, U.S. National Science Foundation (NSF).
4. **Dai, Q.**, Ponta, F., Sun, X., (2016), "Collaborative Research: Nexus of Simulation, Sensing and Actuation for Aerodynamic Vibration Reduction of Wind Turbine Blades", Annual Reports, U.S. National Science Foundation (NSF).
5. **Dai, Q.**, Ponta, F., Sun, X., (2015), "Collaborative Research: Nexus of Simulation, Sensing and Actuation for Aerodynamic Vibration Reduction of Wind Turbine Blades", Annual Reports, U.S. National Science Foundation (NSF).
6. **Dai, Q.**, Ponta, F., Sun, X., (2014), "Collaborative Research: Nexus of Simulation, Sensing and Actuation for Aerodynamic Vibration Reduction of Wind Turbine Blades", Annual Reports, U.S. National Science Foundation (NSF).
7. **Dai, Q.**, Meng, D., Lemmens, R. and You, Z., (2014), "Microfluidic Fabrication of Self-Healing Microfibers for Composite Construction Materials", *Final Report and Annual Reports*, U.S. National Science Foundation (NSF), July.
8. **Dai, Q.** and Ng, K., (2013), "Understanding Mechanism of Internal Frost-Induced Damage of Concrete from Microstructure Aspects", *Final Report and Annual Reports*, U.S. National Science Foundation (NSF), June.
9. You, Z., Yang, X., Mills-Beale, J., and **Dai, Q.** (2013), "Alternative Materials for Sustainable Transportation", *Final Report*, Michigan Department of Transportation, June.
10. 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.
11. You, Z, Goh, S., and **Dai, Q.**, (2011), "Laboratory Evaluation of Warm Mix Asphalt", *Final Report*, Michigan Department of Transportation, September.
12. 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.
13. 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.
14. 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.

15. 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.
  16. 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.
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## TECHNICAL PRESENTATIONS

### Seminars (25)

1. Characterization and Mechanism Analysis of Alkali-Silica Reaction in Cementitious Materials, Advanced Materials Lecture Series, IAAM, 10 December 2020
2. Characterization and Mechanism Analysis of Alkali-Silica Reaction in Cementitious Materials, Advanced Materials Lecture Series, **Keynote presentation**, ICSECT2021
3. Performance Evaluation of Normal and Fiber-Reinforced Rubber Concrete, Seminar of Transportation School, Chang’an University, July 2nd, 2018. **(Invited Seminar)**
4. Fundamental Aspects of Concrete Durability, Chang’an University, July 4th, 2018. **(Invited Seminar)**
5. Recent progress on self-healing asphalt materials, Central South University, June 25<sup>th</sup>, 2018. **(Invited Seminar)**
6. Fundamental Mechanism of Concrete Durability, Hunan University, June 18<sup>th</sup>, 2018. **(Invited Seminar)**
7. Effects of Surface Modification on Performance of Normal and Fiber-Reinforced Rubber Concrete, Seminar of Transportation School, *Changsha University of Science and Technology*, June 15<sup>th</sup>, 2018. **(Invited Seminar)**
8. Multiphysical Self-healing induced with EM energy of graphite modified asphalt mixtures, Seminar of Transportation School, *Changsha University of Science and Technology*, June 18<sup>th</sup>, 2018. **(Invited Seminar)**
9. Fundamental multiphysics aspects on asphalt materials, Beijing University of Civil Engineering and Architecture, June 18<sup>th</sup>, 2018. **(Invited Seminar)**
10. Characterization and simulation of Alkali-silica reacted gel formation and damage development in specially prepared samples, University of Massachusetts Amherst, April 14, 2017.
11. Electromagnetic-Wave Induced Healing of Asphalt Materials Containing Conductive Additives, Seminar of Civil Engineering Department, Columbia University, April 2nd, 2017
12. Fundamental and Application Aspects of Sustainable Materials and Resilient Structures, Seminar of Civil Engineering Department, *Case Western Reserve University*, March 2<sup>nd</sup>, 2017
13. Effects of Surface Modification on Performance of Normal and Fiber-Reinforced Rubber Concrete, Seminar of Transportation School, *Chang’an University*, March 15<sup>th</sup>, 2017. **(Invited Seminar)**
14. Multiscale and Multiphysical Behaviors: Electromagnetic Wave-Induced Healing in Asphalt Materials, Seminar of Engineering Mechanics, *Zhengzhou University*, March 22<sup>th</sup>, 2017. **(Invited Seminar)**
15. Multiscale and Multiphysical Behaviors of Designed Asphalt Materials, Seminar of Transportation School, *Chang’an University*, June 23th, 2016. **(Invited Seminar)**
16. Design and Numerical Evaluation of Smart Material Based Aerodynamic Devices for Wind Turbine Blade Load Reduction, Seminar of Engineering Mechanics, *Xi’an Polytechnic University*, June 15<sup>th</sup>, 2016. **(Invited Seminar)**

17. Micromechanical Modeling of Heterogeneous Infrastructure Materials with X-Ray Computed Tomography Images, Seminar of Civil and Environmental Engineering Department, *Michigan Technological University*, January 2012
18. Fundamental and Application Aspects of Resilient and Sustainable Civil Engineering Materials, Seminar of Civil and Environmental Engineering Department, *Michigan Technological University*, April 2010
19. Multiscale Modeling of Multi-Phase Pavement Materials, Seminar of Civil and Environmental Engineering Department, *Michigan Technological University*, April 2007
20. 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.
21. Micromechanical Modeling of the Constitutive and Damage Behavior of Heterogeneous Composites, Department of Mechanical and Industrial Engineering, *Texas A&M University-Kingsville*, August 2005.
22. Micromechanical Modeling of the Damage-Coupled Constitutive Behavior of Asphalt Mixtures and Experimental Calibration, Department of Civil Engineering, *Zhejiang University*, China, May 7, 2004.
23. 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.
24. 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. (**Invited Seminar**)
25. 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. (**Invited Seminar**)
26. 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.
27. 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.

#### **Oral Conference Presentations (42)**

1. Mechanical Testing and Simulation of Mixed-Species Cross Laminated Timber, EMI/PMC 2021
2. Fresh, mechanical, and durability properties of Steel Fiber-Reinforced Rubber Self-Compacting Concrete (SRSCC), ACI Fall 2020
3. Notched Beam Fracture Test and Simulation of Steel Fiber-reinforced Rubber Self-consolidating Concrete, ASCE EMI Conference 2021
4. Si, R., Wang, J., Guo, S., and Dai, Q., (2018), “Evaluation of Laboratory Performance of Self-Consolidating Concrete with Recycled Tire Rubber”, World Transport Convention, Beijing, China, June 18-21, 2018.
5. Si, R., Wang, J., Guo, S., and Dai, Q., (2018), “Atomic structure and micromechanical properties of metakaolin-based alkali-activated cement with different calcium content”, ASCE EMI Conference, MIT, May 2018.
6. Ma, W., Guo, S., Dai, Q., (2018), “Study on Adhesion of Clay Particle to Metals with Influence of Surface Roughness”, ASCE EMI Conference, MIT, May 2018.

7. Guo, S., and Dai, Q., (2017), “Characterization and mechanism simulation of Alkali-Silica Reaction in Recycled Glass Mortar Samples”, *8th Advances in Cement-Based Materials (Cement 2017)*, State College, GA, July, 2017.
8. Yao, H. and Dai, Q., (2017), “Multiscale and Multiphysical Behaviors of Designed Asphalt Materials”, *The 7th IACIP Annual Workshop*, Washington, DC, January, 2017.
9. Wang, J., and Dai, Q., (2017), “Effects of Surface Modification on Performance of Normal and Fiber-Reinforced Rubber Concrete”, 1st International Workshop on Sustainable Innovation in Transportation Infrastructure, March 30 – 31, 2017, University of Tennessee – Knoxville Campus.
10. Guo, S., Si, R., and Dai, Q., (2017), “Influence of Rubber Aggregate Modification Methods on Rubber Concrete Performance”, TRB, Washington DC, January 8-12, 2017.
11. Wang, J., Si, R., Guo, S., and Dai, Q., (2017), “Property Evaluation and Characterization of Fiber-Reinforced Rubberized Concrete”. *2017 ACI Fall Convention*, Anaheim, CA, October, 2017.
12. Yao, H., Dai, Q., You, Z., (2016), “Molecular Dynamics Simulation of Physicochemical Properties of the Asphalt Model”, Transportation Research Congress 2016, China National Convention Center (CNCC), Beijing, PRC, June 6-8, 2016.
13. Yao, H., Dai, Q., You, Z., (2016), “Case Studies on Micro-and Nano-scale Characterization and Simulation of Cementitious Materials and Asphalt Mixtures”, NSF Workshop on Genome of Stone-based Civil Infrastructure Materials, June 8-9, 2016, Beijing, China.
14. Yao, H., Dai, Q., You, Z., (2016), “Molecular Dynamics (MD) Simulation of Chemophysical Properties of the Control and Modified Asphalt Model”, Inaugural TRC meeting, June 5-8, 2016.
15. Dai, Q., (2015), “Case Studies of Sustainable Technologies for Resilient Structural/Pavement Materials and Structural Components”, *The 5th International Association of Chinese Infrastructure Professionals Annual Workshop*, Jan 11th 2015, Washington, D.C.
16. Yao, H., Dai, Q., and You, Z., (2015), “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.
17. 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.
18. 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.
19. 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.
20. 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.
21. 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, 2013.
22. Dai, Q. and Ng, K. (2013), “Investigation of Internal Frost Damage in Cementitious Materials”, *The Transportation Research Board (TRB) 92th Annual Meeting*, Washington, D.C., January, 2013

23. **Dai, Q.**, Sadd, M.H., and You, Z.(2011), “Micromechanical Viscoelasto-Plastic Modeling of Permanent Deformation of Asphalt Materials”, *Engineering Mechanics Institute 2011*, Boston, MA, June 2-4, 2011.
24. **Dai, Q.**, Sadd, M.H., and You, Z.(2011), “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.
25. **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.
26. **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”, *The Transportation Research Board (TRB) 90th Annual Meeting*, Washington, D.C., January, 2011.
27. **Dai, Q.**, Sadd, M.H., and You, Z.(2011), “An Extended Finite Element Model for Predicting Crack Propagation within Infrastructure Materials”, *Engineering Mechanics Institute 2010*, August, 2010.
28. **Dai, Q.** and Ng, K. (2010), “Micromechanical Constitutive Modeling of Asphalt Mixtures with X-Ray Computed Tomography Images”, *Engineering Mechanics Institute 2010*, August, 2010.
29. **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.
30. **Dai, Q.**, (2007), “A Computer-Aided Design Method Course to Improve Students”, *Design Skills, 2007 ASEE North Midwest Section Conference*, Houghton, MI, September 20-21, 2007.
31. **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.
32. **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.
33. **Dai, Q.** and You, Z., (2006), “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.
34. **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.
35. **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.
36. **Dai, Q.**, Sadd, M.H., (2004), “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.

37. **Dai, Q.** and Sadd, M.H., (2004), “Micromechanical Modeling of Damage-Coupled Viscoelastic Behavior of Asphalt Materials,” *Proceedings of 17<sup>th</sup> ASCE Engineering Mechanics Conference*, University of Delaware, Newark, DE, June 13-16.
38. **Dai, Q.** and Sadd, M.H. (2003), “Micromechanical Simulation of Asphalt Samples Using a Finite Element Network Model,” *Proceedings of 16<sup>th</sup> ASCE Engineering Mechanics Conference*, Seattle, July 16-18.
39. **Dai, Q.** and Sadd, M.H. (2003), “Damage Behavior Simulation of Asphalt Material Using a Microstructural Finite Element Model”, *SEM Graduate Student Symposium*, Worcester Polytechnic Institution, May 1, 2003.
40. Sadd, M.H., **Dai, Q.**, Parameswaran, V. and Shukla, A., (2003), “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.
41. Sadd, M.H., **Dai, Q.**, (2002), “Microstructural Simulation of Asphalt Materials: Modeling and Experimental Verification”, *15th ASCE Engineering Mechanics Conference*, University of Columbia, New York, June 2, 2002.
42. Sadd, M.H., **Dai, Q.**, (2002), “Microstructural Simulation of Asphalt Materials: Modeling and Experimental Verification”, *SEM Graduate Student Symposium*, Stony Brook, New York, May 6, 2002.

#### Poster Presentations (19)

1. Wang, J., and **Dai, Q.**, (2018), “Polyvinyl Alcohol (PVA) Fiber-Reinforced Rubber Concrete”, *The 8th IACIP Annual Workshop*, Washington, DC, January, 2018.
2. Si, R., and **Dai, Q.**, (2018), “Influence of Calcium Hydroxide in Metakaolin-Based alkali-activated cement”, *The 8th IACIP Annual Workshop*, Washington, DC, January, 2018.
3. Wang, J. and **Dai, Q.**, (2018), “Mechanical performance of rubberized concrete with different fibers”, The Cements Division of American Ceramic Society 9th Advances in Cement-Based Materials (**Cements 2018**) in State College, PA, July, 2018
4. Guo, S., and **Dai, Q.**, (2018) “In situ x-ray pair distribution function characterization of phase formation kinetics of calcium-contained alkali-activated cement binder”, The Cements Division of American Ceramic Society 9th Advances in Cement-Based Materials (**Cements 2018**) in State College, PA, July, 2018
5. Wang, J., and **Dai, Q.**, (2018), “Polyvinyl Alcohol (PVA) Fiber-Reinforced Rubber Concrete”, *The 8th IACIP Annual Workshop*, Washington, DC, January, 2018.
6. Si, R., and **Dai, Q.**, (2018), “Influence of Calcium Hydroxide in Metakaolin-Based alkali-activated cement”, *The 8th IACIP Annual Workshop*, Washington, DC, January, 2018
7. Si, R., **Dai, Q.**, and Wang, J., (2017) “Computational and experimental analysis of mechanical and transport properties of rubberized concrete”, The Cements Division of American Ceramic Society 8th Advances in Cement-Based Materials (**Cements 2017**) in Atlanta, GA, July, 2017
8. Si, R., **Dai, Q.**, Guo, S., Wang, J., and Han, S., (2017), “Laboratory performance of rubber-modified self-consolidating and ultra-high performance concrete”, The Cements Division of American Ceramic Society 8th Advances in Cement-Based Materials (**Cements 2017**) in Atlanta, GA, July, 2017
9. Guo, S., **Dai, Q.**, and Sun, X., (2016), “Chemical Composition Analysis of Alkali-glass Powder Reacted Gel”, The Cements Division of American Ceramic Society 7th Advances in Cement-Based Materials (**Cements 2016**) in Evanston, IL, July, 2016
10. Guo, S., **Dai, Q.**, Sun, X., and Sun, Y., (2016), “Ultrasonic Scattering Measurement of Air Void Size Distribution in Early-age and Hardened Concrete Samples”, The Cements Division of American Ceramic Society 7th Advances in Cement-Based Materials (**Cements 2016**) in Evanston, IL, July, 2016

11. 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, *the 91st Annual Transportation Research Board (TRB) meeting*, 2013.
12. **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”, *the 91st Annual Transportation Research Board (TRB) meeting*, 2012.
13. **Dai, Q.**, Yu, X., Ng, K. and Liu, Z., (2010), “Collaborative Research on Internal Frost Damage of Concrete for Sustainable Infrastructures”, *MTU Sustainable Future Institute*, 2010.
14. **Dai, Q.**, Yu, X., Ng, K. and Liu, Z., (2009), “Collaborative Research on Internal Frost Damage of Concrete for Sustainable Infrastructures”, *MTU Sustainable Future Institute*, 2009.
15. **Dai, Q.**, Yu, X., Ng, K. and Liu, Z., (2009), “Internal Frost Damage of Concrete”, *Annual Transportation Forum at Michigan Tech Transportation Center*, 2009.
16. **Dai, Q.**, You, Z., (2006), “Virtual Laboratory Test: Micromechanical Finite Element Modeling Approach for Typical Damage and Constitutive Behavior of Reclaimed Asphalt Concrete”, *MTU Sustainable Future Institute*, 2006.
17. Sadd, M.H., **Dai, Q.**, (2006), “Micromechanical Modeling of the Constitutive and Damage Behavior of Heterogeneous Materials”, *Army Research Laboratory Poster Presentation at Michigan Tech*, 2006.
18. Sadd, M.H., **Dai, Q.**, (2003), “Micromechanical Damage Simulation of Recycled Asphalt Materials”, *Annual Transportation Forum at URI Transportation Center*, 2003.
19. Sadd, M.H., **Dai, Q.**, (2002), “Effect of Microstructure on the Static and Dynamic Behavior of Recycled Asphalt Materials”, *Annual Transportation Forum at URI Transportation Center*, 2002

## FUNDED PROJECTS AS PI

### Principal Investigator

Build Sustainable and Durable Rubber-Modified Concrete Pavement

PI: **Q. Dai** (95%)                      Co-PI: Z. You (5%)

Funding Agency: *Michigan Department of Environment, Great Lakes and Energy (EGLE)*

Funded: \$95,000    Total project value (including cost share): \$180,000    Date: 2022-2023

Build Strong Pavement with Scrap Tire Rubber and Nylon Fiber

PI: **Q. Dai** (95%)                      Co-PI: Z. You (5%)

Funding Agency: *Michigan Department of Environment, Great Lakes and Energy (EGLE)*

Funded: \$95,002    Total project value (including cost share): \$190,004    Date: 2021-2022

New techniques for producing durable fiber-reinforced rubber concrete used in structure applications

PI: **Q. Dai** (95%)                      Co-PI: Z. You (5%)

Funding Agency: *Michigan Department of Environment, Great Lakes and Energy (EGLE)*

Funded: \$85,000    Total project value (including cost share): \$170,000    Date: 2020-2022

Fiber-reinforced High-performance Rubber Concrete for Concrete Structure Construction and Repair

PI: **Q. Dai** (95%)                      Co-PI: Z. You (5%)

Funding Agency: *Michigan Department of Environment, Great Lakes and Energy (EGLE)*

Funded: \$287,518    Total project value (including cost share): \$575,036    Date: 2016-2018

The share of the funding: \$546,284



Collaborative Research: Nexus of Simulation, Sensing and Actuation for Aerodynamic Vibration Reduction of Wind Turbine Blades (collaborate with Dr. Yu at Case Western Reserve University)  
PI: **Q. Dai** (55%)                      Co-PI: F. Ponta (45%)  
Funding Agency: *National Science Foundation (NSF)*  
Funded: \$269,012    Total Project Value (including cost share): \$309,188    Date: 2013-2019  
The share of the funding: \$170,053

Collaborative Research: Nexus of Simulation, Sensing and Actuation for Aerodynamic Vibration Reduction of Wind Turbine Blades (REU support)  
PI: **Q. Dai** (100%)                      Co-PI: F. Ponta  
Funding Agency: *National Science Foundation (NSF)*  
Funded: \$9,800                      Date: 2013-2019

Collaborative Research: Nexus of Simulation, Sensing and Actuation for Aerodynamic Vibration Reduction of Wind Turbine Blades (REU support)  
PI: **Q. Dai** (100%)                      Co-PI: F. Ponta  
Funding Agency: *National Science Foundation (NSF)*  
Funded: \$10,000                      Date: 2013-2019

Collaborative Research: Nexus of Simulation, Sensing and Actuation for Aerodynamic Vibration Reduction of Wind Turbine Blades (REU support)  
PI: **Q. Dai** (100%)                      Co-PI: F. Ponta  
Funding Agency: *National Science Foundation (NSF)*  
Funded: \$10,000                      Date: 2013-2019  
Incorporating Surface-Treated Rubber Particles into Portland Cement Concrete and Geopolymer to Improve Field Performance  
PI: **Q. Dai** (89%)                      Co-PI: S. Fang (2.5%), Z. You (8.5%)  
Funding Agency: *Michigan Department of Environmental Quality*  
Funded: \$333,463                      Total project value (including cost share): \$666,926    Date: 2015-2017  
The share of the funding: \$593,564

Smart flap actuator design for vibration reduction of aerospace structures  
PI: **Q. Dai** (100%)  
Sponsor: *Michigan Space Grant Consortium*  
Funded: \$2,500                      Total project value: \$2,500                      Date: 2014-2016  
The share of the funding: \$2,500

REF-Research Seed: An Electroactive Multiphase Material System with Enhanced Mechanical Properties and Self-Healing and Energy-Harvesting Functions  
PI: **Q. Dai** (100%)  
Sponsor: *Michigan Tech Research Excellence Fund*  
Funded: \$26,000                      Date: 2013-2014  
The share of the funding: \$26,000

Microfluidic Fabrication of Self-Healing Microfibers for Composite Construction Materials  
PI: **Q. Dai** (40%)                      Co-PI: D. Meng (40%), Z. You(20%)  
Funding Agency: *National Science Foundation (NSF)*  
Funded: \$298,921    Total Project Value (including cost share): \$395,698    Date: 2009-2014  
(Note: PI was switched between Drs. Q. Dai and D. Meng in January 2014)  
The share of the funding: \$158,279

Induction Healing of Asphalt Composites Containing Conductive Fibers

PI: **Q. Dai** (100%)

Sponsor: *Michigan Tech Transportation Research Institute*

Funded: \$5,000

Total project value: \$10,000

Date: 2012-2013

The share of the funding: \$5,000

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

PI: **Q. Dai** (100%)

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** (95%)

Co-PI: Z. You (5%)

Funding Agency: *National Science Foundation (NSF)*

Funded: \$190,000 Total Project Value (including cost share): \$225,000 (estimated) Date: 2009-2013

The share of the funding: \$213,750

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

PI: **Q. Dai** (100%)

Sponsor: *Michigan Space Grant Consortium*

Funded: \$5,000

Total Project Value: \$10,000

Date: 2010-2012

The share of the funding: \$5,000

### FUNDED PROJECT AS CO-PI

New Hot Rubber Overlays and Tire Derived Aggregates Construction in Bay County and Clare Count

PI: Z. You (50%)

Co-PI: **Q. Dai** (50%)

Funding Agency: Michigan Dept of Environment Great Lakes and Energy

Funded: \$396,031

Total project value: \$792,062

Date: 2021-2022

Using Tire Rubber Modified Pellet Asphalt for Roadway Paving in Dickinson County

PI: Z. You (50%)

Co-PI: **Q. Dai** (50%)

Funding Agency: *Dickinson County Road Commission*

Funded: \$100,000

Total project value (including cost share): \$200,000

Date: 2021-2022

Enhancing electrical grid and community resilience through repurposing decommissioned mines into underground pumped storage facilities

PI: Roman Sidortsov

Co-PI: **Q. Dai** (15%) as one of Co-PIs

Funding Agency: Sloan Foundation Grant

Funded: \$49,963

Total project value: \$76,443

Date: 2019-2020

Engineering Performance Characteristics of Hardwood Cross Laminated Timber

PI: Xinfeng Xie

Co-PI: **Q. Dai**

Funding Agency: USDA Forest Service, Forest Products Laboratory

Funded: \$45,000

Date: 2017-2019

Using New Rubber Technology to Construct High Volume Traffic Road in Kalamazoo

PI: Z. You (50%) Co-PI: **Q. Dai** (50%)

Funding Agency: *Road Commission of Kalamazoo County*

Funded: \$85,000 Total project value (including cost share): \$170,000 Date: 2018-2019

The share of the funding: \$85,000

Using Rubberized Overlay to Maintain High Volume Traffic Road in Dickinson

PI: Z. You (50%) Co-PI: **Q. Dai** (50%)

Funding Agency: *Dickinson Country Road Commission*

Funded: \$75,000 Total project value (including cost share): \$150,000 Date: 2018-2019

The share of the funding: \$75,000

Tire Rubber Modified Asphalt Emulsion for Effective Pavement Preservation

PI: Z. You (50%) Co-PI: **Q. Dai** (50%)

Funding Agency: *Michigan Department of Environmental Quality*

Funded: \$431,000 Total project value (including cost share): \$862,000 Date: 2017-2019

The share of the funding: \$431,000

Low Emission Asphalt Pavements with Crumb Rubber

PI: Z. You (75%) Co-PI: **Q. Dai** (25%)

Sponsor: *Michigan Department of Environmental Quality*

Funded: \$855,860 Total project value(including cost share): \$1,771,720 Date: 2014-2016

The share of the funding: \$442,930

REF-IE: An Environmental Test Chamber for Mechanical Property Testing at -200 F to 600 F

PI: S. L. Kampe (100%) Co-PI: **Q. Dai**

Sponsor: *Michigan Tech Infrastructure Enhancement Fund*

Funded: \$17,000 Total project value: \$17,000 Date: 2015-2016

Development of Advanced Ultrasonic Techniques for Air Void Size Distribution in Early-Stage and Hardened Concrete

PI: Z. Liu (40%) Co-PI: **Q. Dai** (60%)

Sponsor: *Michigan Tech Transportation Research Institute*

Funded: \$10,000 Total project value: \$10,000 Date: 2014-2016

The share of the funding: \$6,000

Alternative Materials for Sustainable Transportation (bio asphalt)

PI: Z. You (80%) Co-PI: **Q. Dai** (20%)

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

Funded: \$299,960 Total project value (including cost share): \$330,764

Date: 2009-2013

The share of the funding: \$66,153

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

PI: Z. You (75%) Co-PI: **Q. Dai** (25%), T. Van Dam

Funding Agency: *National Science Foundation (NSF)*

Funded: \$173,698 Total project value including cost share): \$206,244

Date: 2007-2013

The share of the funding: \$51,561

Laboratory Evaluation of Warm Mix Asphalt

PI: Z. You (80%) Co-PI: **Q. Dai** (20%)

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

Funded: \$190,000 Total project value (including cost share): \$228,100

Date: 2008-2011

The share of the funding: \$45,620

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

PI: Z. You (75%) Co-PI: **Q. Dai** (25%)

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

Funded: \$181,924 Total project value (including cost share): \$245,597

Date: 2007-2009

The share of the funding: \$61,399

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### AWARDS AND HONORS

- IAAM Scientist Award, 2020
- World's Top 2% Scientists, 2020, 2021, by Stanford University
- Distinguished reviewer, 2020, Journal of Infrastructure Preservation and Resilience
- Recipient of the 2017 Journal of Aerospace Engineering Best Paper Award
- Selected idea presentation at the NSF Workshop on Additive Manufacturing for Civil Infrastructure Design and Construction, Arlington, VA; July 13-14, 2017
- *NSF fellowship* to participate the International Workshop on the Genome of Stone-Based Civil Infrastructure Materials, hosted by University of Science and technology, Beijing, China, June 8-9, 2016.
- *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 Award –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 AND ADVISING

At Michigan Tech, since her appointment in the Department of Civil and Environmental Engineering, Dr. Dai has taught three different undergraduate classes and three graduate classes. Her teaching load generally averages 3 formal courses per academic year, in addition to M.S. and Ph.D. research supervision. She has directed 11 PhD and 5 thesis MS students to obtain academic degrees as major advisor, and has served on the advisory committee for graduate students from different departments. She is currently advising/co-advising 3 PhD students.

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## ADVISING

### Graduate Students (Committee Chair)

#### Current PhD students

- Miaomiao Li, PhD student, expected to graduate in spring 2024
- Peifeng Su, PhD student, expected to graduate in spring 2024
- Yunxiang Ma, PhD student, expected to graduate in spring 2020

#### Graduated PhD students

- Ruizhe Si, PhD student, graduated in Summer 2019
- Jiaqing Wang, PhD student, graduated in fall 2020
- Xiaodong Zhou, PhD student, graduated in summer 2021
- Lingyun You, PhD student, co-advising, graduated in fall 2019
- Shuaicheng Guo, PhD student, graduated in fall 2017 (Thesis Title: The Experimental and Theoretical Simulation Study of Alkali Silica Reaction in Cementitious Materials, currently work as post-doc researcher at Michigan Tech)
- Xiao Sun, PhD student, graduated in fall 2016 (Thesis Title: Smart Aerodynamic Control Devices Design and Vibration Reduction Analysis for Wind Turbine Blades, currently work as Associate Professor at Hohai University in Nanjing, China)
- Renee Oats, PhD student, co-advising, graduated in fall 2016 (Thesis Title: Advanced Photogrammetry-Based Techniques for Condition Assessment of Infrastructure Systems and Structural Components, currently work as a post-doc research at University of Delaware)
- Hui Yao, PhD student, co-advising, graduated in summer 2016 (Thesis Title: Property Analysis of the Asphalt Materials Using Molecular Dynamics (MD) Method, currently work as Professor at Beijing University of Technology in Beijing, China)
- Zigeng Wang, PhD student, graduated in spring 2016 (Thesis Title: Integrated Computational and Experimental Evaluation of EM Energy-Induced Self-Healing Performance of Asphalt Composites, currently work as Assistant Professor at Beijing University of Technology in Beijing, China)
- Ryan Lemmens, PhD student, co-advising, graduated in fall 2014 (Thesis Title: Microfluidic Encapsulation for Self-Healing Material And Investigation of Its Impacts on Composite Performance, currently work as a research engineer in Industry)
- Kenny Ng, PhD student, graduated in fall 2012 (Thesis Title: Integration of computational models and experimental characterization to study internal frost damage in cementitious materials, currently work as a research engineer at GE)

#### Master students

- Song Han, MS course work student, graduated in spring 2018 (Coursework)
- Jiaqing Wang, MS research thesis student, graduated in fall 2017 (Thesis title: Polyvinyl Alcohol (PVA) Fiber-Reinforced Rubber Concrete and Rubberized Self-Compacting Concrete)
- Xin Gao, MS course work student, expected to graduate in fall 2018
- Ruizhe Si, MS research thesis student, graduated in fall 2016 (Thesis Title: An Experimental Investigation of the Properties of Portland Cement Concrete and Mortar Containing Pre-Modified Rubber Aggregate)
- Chao Lu, MS research thesis student, graduated in spring 2017 (Thesis Title: Design of a Shape Memory Alloy Actuator)
- Wanbing Bai, MS course work student, graduated in spring 2017 (Coursework)
- Xiao Sun, MS research thesis student, graduated in spring, 2014 (Thesis Title: Smart Aerodynamic Control Devices Design and Vibration Reduction Analysis for Wind Turbine Blades)

- Jun Zhou, MS research thesis student, graduated in spring, 2011 (Thesis Title: A Study of Acoustic Emission Technique For Concrete Damage Detection)

#### **Undergraduate students**

- Jon Marino (CE undergraduate): work on preparation of the alkali-activated materials. (hourly paid in summer 2017)
- Aiden Truettner (CE undergraduate): work on processing of the biomass materials to obtain bio-asphalt. (hourly paid in summer 2018)
- Michael Nowak (EE undergraduate): work on test of the wind turbine model. (hourly paid in summer 2018)
- Austin Putnam-Johnson (ME undergraduate): work on processing of the lignin to obtain bio-asphalt. (hourly paid in summer 2018)
- Trevor Peffley (EE undergraduate): work on test of the wind turbine model. (hourly paid in summer 2018)
- Aaron Kramer (EE undergraduate): work on test of the wind turbine model. (hourly paid in summer 2018)
- Gavin Gudobba (CEE undergraduate): work on preparation of the fiber reinforced concrete. (hourly paid in fall 2017)
- Syd Mukavetz (CEE undergraduate): work on preparation of the fiber reinforced concrete. (hourly paid in spring 2017)
- Madison Olmstead (CEE undergraduate): work on preparation of the fiber reinforced concrete. (hourly paid in spring and fall 2017-2018)
- Pierce Treend (CEE undergraduate): work on preparation of the rubberized concrete. (hourly paid in summer 2016-spring 2017)
- Caleb Dann (CEE undergraduate): work on preparation of the rubberized concrete. (hourly paid in summer 2016-spring 2017)
- Travol Boal (ME undergraduate): work on test of the wind turbine model. (hourly paid in summer 2017)
- Luke McCloskey (ME undergraduate): work on test of the wind turbine model. (hourly paid in summer 2016)
- Seth Mares (ME undergraduate): work on test of the wind turbine model. (hourly paid in summer 2016)
- Lewis Marshall (MSE undergraduate): work on testing of self-healing materials. (hourly paid in fall 2015)
- Jacob Kurtz (ME undergraduate): work on test of the wind turbine model. (hourly paid in spring, summer and fall 2015)
- Wanbing Bai (CEE undergraduate): work on preparation of the concrete samples. (hourly paid in spring, summer and fall 2015)
- Autumn Storteboom (CEE undergraduate): work on flap actuator prototype design with graduate student Xiao Sun, fall 2014, summer and fall 2015. (NSF REU student with hourly paid)
- Nicholas Bresler (CEE undergraduate): work on chemical treatment of crumb rubber particles and prepare the rubber concrete for the performance study. (hourly paid in fall 2014 and 2015)
- Derek Waldorf (CEE undergraduate): work on performance testing and induction healing applications of carbon fiber reinforced asphalt mixtures and check the applicable method for liquid rubber asphalt, summer & fall 2014. (NSF REU student with hourly paid)
- Jordan Hoekwater (CEE undergraduate), work on concrete sample preparation, spring 2012
- Morgan Hansen (CEE undergraduate), work on cement concrete sample preparation, summer 2012

- Ubaldo Rodriguez (CEE undergraduate), work on asphalt concrete sample preparation, summer 2012
- Thaddus Waterman (CEE undergraduate), work on asphalt concrete sample preparation, since fall 2009
- Mike Wyzlic (CEE undergraduate), work on concrete sample preparation, summer 2009
- Benjamin Roskoskey (CEE undergraduate), work on cement concrete sample preparation, summer 2009

### Visiting Scholars

- Dr. Zhenfeng Li, visiting scholar, from Taiyuan Science and Technological University (Vice Dean of School of Transportation and Logistics in China), Aug. 2011- July. 2012.
- Dr. Wenbo Ma, visiting scholar, from Xiangtan University (Assistant Dean of School of civil engineering and mechanics) in China, Aug. 2017- Aug. 2018
- Dr. Zhi Wang, visiting scholar, from Zhengzhou University in China, Aug. 2017- Aug. 2018
- Miss. Fangyuan Gong, from Chang'an University in China, October 2016-October 2018

### Graduate Committee Member

- Member of Doctoral Committee (not directly advised students), *Sanjeev Adhikari, Yu Liu, Julian Mills-Beale, Xu Yang, Mohd Rosli Mohd Hasan, Benjamin Winter, Chao Zhang, Siyu Chen and DongDong Ge* 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 Doctoral Committee (not directly advised students), *Ashok Khanal*, in Department of Chemistry, Michigan Tech
- Member of Master Committee, *Xu Yang, Mohd Rosli Mohd Hasan, Aakash Ahuja, Kevin Mears, Benjamin Winter, Eric Kreiger, David Porter* 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
- Member of Master Committee, *Shengnan Li*, Department of Mathematics, Michigan Tech

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## PROFESSIONAL SERVICE

Dr. Dai has served as an Associate Editor for ASCE's Journal of Materials in Civil Engineering since November 2011, and a guest editor for several journal special issues. She is a member of ASCE and American Concrete Institute (ACI). She served as committee chair for the World Transport Congress. She also served on various technical ASCE and ACI committee as active members. She also served on campus-level committees and committee chair on department-level committees. She served on review panels for several NSF programs, and also worked as an electronic reviewer for several NSF and DOE funding programs. She also organized workshops and several conference sessions.

### 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.

- *Guest editor, MPDI Applied Science special issue on Sustainable Infrastructure Materials*

Special Issue:

[http://www.mdpi.com/journal/applsci/special\\_issues/paving\\_technologies](http://www.mdpi.com/journal/applsci/special_issues/paving_technologies)

- *Guest editor, Hindawi Advances in Materials Science and Engineering special issue on Advanced Pavement Materials for Sustainable Transportation Infrastructure*

<https://www.hindawi.com/journals/amse/si/361317/>

- *Guest editor, ASCE Journal of Materials in Civil Engineering: as a guest editor for a special issue section entitled, “ Special Issue on Advanced Pavement Technologies.”*

Advanced pavement technologies, You, Z. Dai, Q., 2018 Journal of Materials in Civil Engineering 30(9), [https://doi.org/10.1061/\(ASCE\)MT.1943-5533.0002475](https://doi.org/10.1061/(ASCE)MT.1943-5533.0002475)

### **Professional Society member**

- Member, American Society of Civil Engineering (ASCE)
- Member, American Concrete Institute (ACI)

### **Professional Committee Member**

- Subcommittee Chair, ACI 555OC, Recycled Materials – Unbounded RCAs
- Committee chair, World Transport Congress (WTC), on aggregates and base/subbase materials, 2018
- Organizing Committee Members of Annual Workshop, International Association of Chinese Infrastructure Professionals (IACIP), 2016-present
- Secretary and founding member, Asian-American Pavement Engineers Association (AAPEA), 2015
- Committee Member, ASCE Granular Materials Committee, Engineering Mechanics Institute, 2010-present
- Committee Member, ASCE Pavement Mechanics Committee, Engineering Mechanics Institute, 2014-present
- Committee Member, ASCE Bituminous Materials Committee, Construction Institute, 2011-present
- ASCE Committee Member, Pavement Committee, Geo-Institute, 2011 - present
- Committee Member, ASCE Geophysics Committee, Geo-Institute, 2011 - present
- Committee member, ACI Committee 201, Durability of Concrete, 2016 - present
- Committee member, ACI Committee 555, Concrete with Recycled materials, 2016 - present
- Committee member, ACI Committee 236, Material Science, 2016 - present

### **University and Department Committee Member**

- University Committee Member, Committee on Academic Tenure, Promotion and Reappointment, 2019-2023
- University Committee Member, Faculty Distinguished Service Award Committee (2014-2017)
- MME Department TPR Committee member, 2021-2022
- Department Committee Chair, Award Committee, 2020-2022
- Department Committee Chair, Space Committee, 2019-2020
- Department Committee Member, CEE Graduate Research Committee, fall 2015-spring 2017
- Department Teaching and Research Software Committee Chair, Fall 2017-Fall 2018
- Department Space Committee Chair, Fall 2018-present



## Technical Review

- *Journal of Materials in Civil Engineering*, American Society of Civil Engineers (ASCE)
- *Journal of Engineering Mechanics*, ASCE
- *Journal of Transportation Engineering*, ASCE
- *Mechanics of Materials*, Elsevier
- *Engineering Fracture Mechanics*, Elsevier
- *Construction and Building materials*, Elsevier
- *Computer Methods in Applied Mechanics and Engineering*, Elsevier
- *International Journal of Pavement Engineering*, Taylor & Francis
- *International Journal of Geomechanics*, ASCE
- *Canadian Journal of Civil Engineering*
- *Geotechnical Special Publication (GSP)*, ASCE
- *ASCE GeoFrontier*
- *International Journal of Solids and Structures*, Elsevier
- *Material and Design*, Elsevier
- *Acta Mechanica*, Springer
- *Journal of Clean Production*, Elsevier
- *Theoretical and Applied Fracture Mechanics*, Elsevier
- *Applied Science*, MDPI
- *Journal of Testing and Evaluation*, ASTM
- *Fuel*, Elsevier
- *Frontiers of Structural and Civil Engineering*, Springer
- *Engineering Fracture Mechanics*, Elsevier

## Grant Review

- *ACS PRF Grant Program review, 2018*
- *FY 2016 Consolidated Innovative Nuclear Research (NEUP/NEET/NSUF) Funding*
- *FY 2017 Consolidated Innovative Nuclear Research (NEUP/NEET/NSUF) Funding*
- *NSF review panel, Engineering for Civil Infrastructure, 2019*
- *NSF review panel, Structure Materials and Mechanics (SMM) program 2011, 2013& 2014*
- *NSF review panel, Hazard Mitigation and Structural Engineering program, 2013& 2014*
- *NSF review panel, Manufacturing Machines and Equipment (MME) Program and SBIR-Construction Material program, 2014*
- *Electronic NSF proposal Reviewer, CBET Environmental Sustainability program and Career Proposal in Material Processing and Engineering program, 2018*
- *Electronic NSF proposal Reviewer, DOE Nuclear Research (NEUP/NEET/NSUF) Funding program, 2015, 2016 and 2017*
- *Louisiana Board of Regents' Research Competitiveness Subprogram, 2012*

## Conference and Workshop Organization

- Session Chair, 16th US National Congress on Theoretical and Applied Mechanics (USNCTAM), Pennsylvania State University, PA, 2010,
- Session Moderator, 2010 ASCE Engineering Mechanics Institute Conference, Los Angeles.
- Session Chair, 2014 ASCE Engineering Mechanics Institute Conference, Hamilton, CA.
- Session Chair, IACIP Annual Workshop 2016.
- Session Moderator, ACI spring convention 2017.
- Session Chair, World Transport Congress 2018.
- Session Chair, ASCE EMI conference 2021