

# Mohammadreza (Reza) Mirzahosseini, Ph.D., P.E.

Visiting Assistant Professor

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## Education

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- May 2014, Ph.D., Civil Engineering (Transportation Materials), Department of Civil Engineering, Kansas State University (KSU), Manhattan, KS. Dissertation Title: *Glass Cullet as a new Supplementary cementitious material (SCM)*.
- Mar. 2009, M.Sc., Highway & Transportation Engineering, Department of Civil Engineering, Iran University of Science and Technology (IUST), Tehran, Iran. Thesis Title: *Comparison of Marshall and Dynamic Creep Test Results in Asphalt Mixture Design*.
- Sep. 2006, B.Sc., Civil Engineering, Department of Civil Engineering, Iran University of Science and Technology (IUST), Tehran, Iran.

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## Research Background

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- Jan. 2022 – present, Visiting Assistant Professor, Lyles School of Civil Engineering, Purdue University, West Lafayette, IN
  - Preparing a field handbook for maintenance and preservation treatments of concrete pavements in Indiana
- Feb. 2018 – Dec. 2021, Post-Doctoral Researcher, Lyles School of Civil Engineering, Purdue University, West Lafayette, IN – Supervisor: Dr. Jan Olek
  - Locally calibrating the coefficients of different distress models used in Pavement ME for the State of Indiana
  - Characterizing performances properties of asphalt mixtures throughout the State of Indiana
  - Visual assessing cracking condition of pavements surfaces throughout the State of Indiana
  - Evaluating performance properties and delamination characteristics of I-64 (South Indiana)
- Jan. 2011 – May 2014, Department of Civil Engineering, Kansas State University (KSU), Manhattan, KS – Supervisor: Dr. Kyle Riding
  - Quantified the relationship between particle size and reactivity of crushed recycled glass as a new cementitious material in concrete (NSF Project, CMMI-1032636)
  - Determined potential alkali-silica reactivity for concrete pavements containing limestone aggregates for the Kansas Department of Transportation (KDOT)
  - Mentored six undergraduate students working on lab activities
- Sep. 2006 – Mar. 2009, Graduate Research Assistant, Department of Civil Engineering, Iran University of Science and Technology (IUST), Tehran, Iran.
  - Correlated rutting potential of asphalt mixtures to the Marshall mix design parameters
  - Learned the fundamentals of Marshall mix design, volumetric properties of asphalt mixtures, rutting potential of asphalt mixtures, and modeling asphalt mixture rutting.

## Teaching and Advising Experience

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- Jan. 2022 – present, Visiting Assistant Professor, Lyles School of Civil Engineering, Purdue University, West Lafayette, IN
  - Airport Design
- 2021 (January – May), Adjunct Faculty, Department of Civil Engineering, Valparaiso University (Valpo), Valparaiso, IN
  - Construction Materials (two classes).
- Aug. 2019 – present, Adjunct Faculty, School of Art, Science, and Education, Ivy Tech Community College, Lafayette, IN
  - Physical Science (four classes)
- Jul. 2018 – present, Adjunct Faculty, College of Professional Studies, Department of Industrial and Manufacturing Engineering, Indiana Tech, Indianapolis, IN
  - CAD I – Parametric Modeling (two sessions), Material Science, Fundamentals of Physics, Computer Integrated Manufacturing, Advanced Computer Integrated Manufacturing (two sessions), Six Sigma III, Statistics and Dynamics, Fundamentals of Mathematics, Auto CAD (two sessions), Integrated Resource Management, Mathematical Problem Solving, and Applied Statics.
- 2014, Grader for Statics, Department of Civil Engineering, Kansas State University, Manhattan, KS
- 2009 – 2010, Lecturer, University of Payam-e Noor, Damavand, Iran
  - Mathematics (including algebra, calculus, and trigonometry) (two sessions).
  - Soil Mechanics (three sessions).
  - Surveying (one session).
  - Mechanics of Materials (two sessions).

## Selected Awards and Honors

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- 2014, Outstanding Reviewer of ASCE, Journal of Bridge Engineering
- 2013, Outstanding Ph.D. Student of the Year, Department of Civil Engineering at KSU
- 2013, Top Presenter award, KSU Graduate Poster Session: Research and the State
- 2013, The Best Graduate Poster award, KSU Open House Day
- 2005, Outstanding Bachelor Student award, IUST, Tehran, Iran

## Publications

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### Peer-reviewed journal papers

**M. Mirzahosseini, J. Jeon, J. Lee., J. Olek, and T. E. Nantung, “Predicting Fatigue Service Life Reductions (FSLR) of Asphalt Pavements Due to Deficiency in Design-Level Values of Effective Binder Content ( $\Delta V_{be}$ )”, Canadian Journal of Civil Engineering [Accepted for Publication – 2022]**

**M. Mirzahosseini**, J. Lee., J. Olek, J. Jeon, and T. E. Nantung, “*Analysis of the Effects of Deficiencies of Voids in Mineral Aggregate on Pavement Fatigue Performance using AASHTOWare Pavement ME Design and FlexPAVE*”, *Materials Performance and Characterization*, Vol. 10, No. 1, pp. 700-717, September 2021. [Part of Post-Doctoral Research]

**M. Mirzahosseini**, P. Jiao, K. Barri., K.A. Riding, and A. Alavi, “*New machine learning prediction models for compressive strength of concrete modified with glass cullet*”, *Engineering Computations*, Vol. 36, No. 3, pp. 876-898, April 2019. [Built off Doctoral Research]

E. J. Gardoczi, K. A. Riding, and **M.R. Mirzahosseini**, “*Particle Shape Effects on Particle Size Measurement for Crushed Waste Glass*” Elsevier – *Advanced Powder Technology*, Vol. 28(2), pp. 648–657, February 2017. [Part of Doctoral Research]

**M.R. Mirzahosseini**, K. A. Riding, “*Influence of Different Particle Sizes On Reactivity of Finely Ground Glass as New Supplementary Cementitious Material (SCM)*” *Cement and Concrete Composite*, Vol. 56, pp. 95-105, February 2015. [Part of Doctoral Research]

**M.R. Mirzahosseini**, K. A. Riding, “*Effect of Combined Glass Particles on Hydration in Cementitious Systems.*” *ASCE – Journal of Materials in Civil Engineering*, Vol. 27(6), pp. 04014190-1 – 04014190-15, June 2015. [Part of Doctoral Research]

**M.R. Mirzahosseini**, Y. M. Najjar, A.H. Alavi, and A.H. Gandomi, “*The Next-Generation Models for Evaluation of Rutting Potential of Asphalt Mixtures*” *ASCE – International Journal of Geomechanics*, Vol. 15(6), pp. 04015009-1 – 04015009-15, April 2015. [Part of Master’s Research]

**M.R. Mirzahosseini**, K. A. Riding, “*Effect of Curing Temperature and Glass Type on the Pozzolanic Reactivity of Glass Powder*” *Cement and Concrete Research*, Vol. 58, pp. 103-111, April 2014. [Part of Doctoral Research]

**M.R. Mirzahosseini**, A.H. Alavi, A.H. Gandomi, “*Permanent Deformation Analysis of Asphalt Mixtures Using Soft Computing Techniques*” *Expert Systems with Applications*, Vol. 38(5), pp. 6081-6100, May 2011. [Part of Master’s Research]

A.H. Alavi, M. Ameri, A.H. Gandomi, **M.R. Mirzahosseini**, “*Formulation of Flow Number of Asphalt Mixes Using Hybrid Computational Method*” *Construction and Building Materials*, Vol. 25(3), pp. 1338-1355, March 2011. [Part of Master’s Research]

A.H. Gandomi, A.H. Alavi, **M.R. Mirzahosseini**, F. Moghaddas Nejad, “*Nonlinear Genetic-Based Model for Prediction of Flow Number of Asphalt Mixtures*” *ASCE – Journal of Materials in Civil Engineering*, Vol. 23(3), pp. 248-263, March 2011. [Part of Master’s Research]

### Selected conference presentations

**Mirzahosseini, M.R.** “*Sensitivity of Pavement ME Fatigue Cracking Predictions on Effective Binder Contents*” AASHTO Pavement ME National Users Group Meeting, New Orleans, Louisiana, US, November 2019.

**Mirzahosseini, M.R.** and Riding, K. “*Study of the Feasibility of Using Combined Glass Particle Sizes and Types in Concrete as Partial Cement Replacement*” ACI Spring Convention, Reno, Nevada, US, March 2014.

**Mirzahosseini, M.R.** and Riding, K. “*Finely Ground Glass in Concrete as a New Supplementary Cementitious Material (SCM)*” 91<sup>st</sup> Engineering Open House: Empowering Students to Impact Our Future, Kansas State University, Manhattan, Kansas, US, April 2013.

**Mirzahosseini, M.R.** and Riding, K. “*Glass Cullet as a new supplementary cementitious material (SCM); what are the effects of size distributions and types on glass reactivity?*” ACI Spring Convention, Minneapolis, Minnesota, US, April 2013.

**Mirzahosseini, M.R.**, Najjar, Y. M., Alavi, A. H., and Gandomi, A. H. “*ANN-Based Prediction Model for Rutting Propensity of Asphalt Mixtures*” 92<sup>nd</sup> annual meeting of Transportation Research Board, National Research Council, Washington, D.C., US, January 2013.

**Mirzahosseini, M.R.** and Riding, K. “*The Effects of Temperature on Glass Hydration in Cementitious Systems*” ACI Spring Convention, Dallas, Texas, US, March 2012.

**Mirzahosseini, M.R.**, Ameri, M., Moghaddasnejad, F., and Alavi, A.H. “*Evaluation of Rutting Potential of Asphalt Mixtures Using Computational Intelligence Technique*” 11<sup>th</sup> International Conference on Asphalt Pavements, Nagoya Japan, August 2010. (Published in Proceeding)

### Technical Note

Kyle A. Riding, Asad Esmaily, and **Mohammadreza Mirzahosseini**, “*Measurement of the Pore Size Distribution of Limestone Aggregates in Concrete Pavement Cores: Phase I*” Kansas Department of Transportation (KDOT) Final Report, Rep. No. KS-12-1, April 2012.

### Grant/Proposal Writing Experience

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- 2021, Application of Smart Materials/Technologies in repairing concrete infrastructures. In collaboration with Dr. Alavi at the University of Pittsburgh. [Under Preparation]
- 2020, Hot Mix Asphalt (HMA) Performance-Based Pay Factor (PBPF) for Indiana. Submitted to the Joint Transportation Research Program (JTRP) Focus Group Meeting. [Selected for the final short list]
- 2020, Feasibility study of using soil scanner to extract soil gradation properties required for construction. Submitted to the Joint Transportation Research Program (JTRP) Focus Group Meeting. [Selected for the final short list]
- 2020, Life Cycle Cost Analysis (LCCA) of flexible pavement longitudinal joint treatments. Submitted to the Joint Transportation Research Program (JTRP) Focus Group Meeting. [Selected for the final short list]
- 2018, Using innovative technologies (LiDAR Data and Drones) in concrete infrastructure crack detection. [Prepared the final draft – not submitted]

### Professional Experience

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- 2014 – 2017, Project and Design Engineer, Schwab Eaton P.A., Manhattan, KS
  - Highway design of US-83 using Microstation Geopak
  - Drainage and hydrologic studies of US-83 and US-24
  - Ditch study and design of US-83
  - Pavement design and Completed visual inspection of the parking lot and inroads’ pavements using PCI, pavement condition evaluation, and repair design
  - Pavement marking & signing, and safety study of US-169

- 2008 – 2010, Supervisor of the Department of Pavement Management Systems (PMS), Tadbir Foroud Rah Consultant Engineers Company, Tehran, Iran
  - Mentored 12 members of a PCI pavement surface distress evaluation team
  - Evaluated pavement condition from automated pavement condition vehicle data collection system and designed repairs for 1970 miles of pavement using PCI
  - Completed visual inspection of aviation facilities' pavement (runway, taxiway, and apron) using PCI, pavement condition evaluation, and repair design for two international airports in Iran.
- 2006 – 2007, Highway Design & Pavement Engineer, Baryand Consultant Engineers Company, Iran
  - Completed visual inspection of pavement using PCI, pavement condition evaluation, and repair design for a total of 290 miles of pavement on five projects
  - Performed concrete bridge inspections and identified possible repair methods for 150 bridges
  - Performed traffic studies, designed pavements, and traffic control systems for 235 miles of pavement on eight projects.

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### Relevant Courses

- Sustainable Transportation Asset management (KSU), Hot-Mix Asphalt (HMA) Mixture and Construction (KSU), Portland Cement Concrete Pavement (KSU), Construction Materials II (KSU), Concrete Pavement and Bridge Repair (KSU), and Concrete Durability (OSU).
- Pavement Design (IUST), Transportation Engineering (IUST), Highway Geometric Design (IUST), and Asphalt Binder Laboratory (IUST). Advanced Geometric Design (IUST), Advanced Pavement Design (IUST), Advanced Asphalt Binder Laboratory (IUST), Pavement Management System (IUST), and Airport Pavement Design (IUST).

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### Licenses

- **Engineering-In-Training (EIT):** Certificate No. 154002, 2014, California Board of Professional Engineers
- **Professional Engineering (PE):** Licensed in the State of Texas – PE # 129014.

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### Professional Development

- 2021 (April) – present, Official Associate Editor of Measurement
- 2020 – Present, Official reviewer of Measurement
- 2016 – Present, Official reviewer of The Open Cybernetics & Systemics Journal
- 2015 – Present, Official reviewer of Materials, Materials & Design, and Construction & Building Materials (Elsevier).
- 2011 – 2013, Founder and President, K-State Iranian Graduate Student Association (IGSA)
- 2011 – Present, American Concrete Institute (ACI), Member

## **Lab & Field Equipment/Computing Skills**

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- **Lab Equipment:** Strain Gauges, Pressure Cells, Moisture and Temperature Sensors, Isothermal Calorimetry, Chemical shrinkage, Thermogravimetric Analysis (TGA), Scanning Electron Microscopy (SEM), X-ray Diffractometer (XRD), Freeze-Thaw Machine, Concrete Compressive Strength Test Device, Marshall Mix Design Equipment including Marshall Compactor and Marshall Stability Device, Universal Testing Machine (UTM), Hamburg Wheel Track (HWT) Test Device, Superpave Equipment including Gyratory Compactor, Pressure Aging Vessel (PAV), Rolling Thin-Film Oven (RTFO), Dynamic Shear Rheometer (DSR), Bending Beam Rheometer (BBR), Asphalt Mixture Performance Testing (AMPT).
- **Field Equipment:** Falling Weight Deflectometer (FWD), Ground Penetrating Radar (GPR), Locked Wheel Skid Resistance, and Longitudinal & Transverse Profilometer.
- **Computer Software Programs:** FAARFIELD, Pavement ME (MEPDG), FlexPAVE™, Elmod, Microstation Geopak, Bentley PondPack, HY-8, HEC-RAS, HEC-HMS, Micropaver, Arc GIS, AutoDesk Land, AutoCAD, Civil 3D, SPSS, Find Graph.
- **Programming Languages:** Python, Java, C++, HTML.