

# Hermoine (He) Wang

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## EDUCATION

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**PhD Candidate in Civil Engineering, University of Illinois, Urbana-Champaign** Aug 2018

*Thesis: Investigation on block cracking mechanism in asphalt pavements* | GPA: 3.74/4.00

Advisor: Prof. William G. Buttlar

Illinois Asphalt Pavement Association Scholarship, 2016

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**MS in Transportation Engineering, Harbin Institute of Technology, China** July 2013

*Thesis: The development, performance evaluation and implementation of solar-reflective coating as a cooling overlay for asphalt pavements*

Graduate with Honor (top 1); Excellent Graduate Thesis Award (top 1), 2013

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**BS in Transportation Engineering, Harbin Institute of Technology, China** July 2011

*Thesis: Geometric design, pavement materials and structure design of interstate highway S203, China*

President of Transportation School Student Organization; Excellence in Student Leadership Award (top 1%)

Transportation Outstanding Student Scholarship (5%); Outstanding Student Award (5%), 2011

## RESEARCH EXPERIENCE

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**Research Assistant, University of Illinois, Urbana-Champaign** 2013 - present

### *Analytical solution and Simulation:*

- Investigate block cracking mechanism in asphalt pavements
  - Developed 3D analytical solutions of elastic pavement model subjected thermal stresses
  - Built new contact model in C++ for viscoelastic material stress analysis
  - Developed PFC algorithm to simulate crack initiation and propagation in asphalt pavement subjected thermal stresses, and propose the effective rehabilitation methods for block cracks.
  - Developed PFC, MATLAB and AutoCAD algorithms to predict block cracking potential, crack pattern and severity level of a given asphalt pavement.
- Behavior characterization of asphalt materials
  - Predicted the thermal cracking possibility of given asphalt mixtures with MATLAB
  - Analyzed the stress distribution of disk-shaped viscoelastic material samples with ABAQUS

### *Laboratory experiment:*

- Participated in developing creep compliance test of asphalt materials with disk-shaped compact/tension test facility
- Designed various types of asphalt mixtures with reclaimed asphalt materials /ground tire rubber
- Characterized dynamic modulus, creep compliance, fracture and fatigue behaviors of many asphalt and asphalt mixes

### *Field data analysis:*

- Accomplished pavement evaluation of Race Street (Michigan St. to Washington St.) in Urbana IL, including pavement condition survey, PCI calculation, coring data evaluation and FWD data analysis. Three alternative rehabilitation design methods along with corresponding cost estimation were proposed.

### *Performance-based design approach development for asphalt materials:*

- Developed Performance-space diagram to evaluate high/ low-temperature performance of asphalt mixtures
- Proposed the performance-based mix design approach for highly heterogeneous asphalt mixtures

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**Research Assistant, Harbin Institute of Technology, China** 2010 - 2013

- Developed nanoparticles modified solar-reflective coating as a cooling overlay for asphalt pavements
- Developed chloride/ceramicite modified asphalt mixtures with high de-icing performance

## WORK EXPERIENCE

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**Teaching Assistant**, University of Illinois, Urbana-Champaign Fall 2015  
Asphalt Materials I, **top 10%** Teaching Excellence  
Taught lab sections, presented and supervised experimental approaches of asphalt and asphalt mixture properties

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### **Engineering Intern**

Jinan Urban Construction Group Summer 2012  
◦ Designed solar-reflective coating at bus stops of BRT system in Jinan, China  
◦ Evaluated the cooling performance of the paved overlay

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Beijing Shoufa Xingye Highway Maintenance and Construction Co., Ltd. Summer 2011  
◦ Designed solar-reflective coating at a parking lot in Beijing, China  
◦ Developed the construction approach of solar-reflective coating as cooling overlay for asphalt pavements

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## SKILLS

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Software: C, C++, Python, MATLAB, AutoCAD, Civil3D, ABAQUS, and PFC

Testing: material strength/stiffness, dynamic modulus, creep compliance, fracture and fatigue properties

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## PUBLICATION

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### **Journal Paper/ Book**

- **Wang, H.**, Buttlar, W.G. (2018). 3-D Analytical Model for Exploration of the Block Cracking Phenomenon in Asphalt Pavements (submitted). Road Materials and Pavement Design, 2018.
- **Wang, H.**, Buttlar, W.G. (2018). Modern, Recycled SMA Mixtures on the Illinois Tollway and Preliminary Performance-based Mix Design Approach, Journal of the Association of Asphalt Paving Technologist, 2018.
- Hill, B.C., **Wang, H.**, Buttlar, W.G. (2016). Effects of Recycled Shingles and Virgin Asphalt Binder Mixing on Mixtures Performance. 8<sup>th</sup> RILEM International Conference on Mechanisms of Cracking and Debonding in Pavements, 13, 291-297.
- Buttlar, W.G., Hill, B.C., **Wang, H.**, Mogawer, W. (2016). Performance-Space Diagram for the Evaluation of High and Low Temperature Asphalt Mixture Performance. Association of Asphalt Paving Annual Meeting, 2016.
- Xie, N., **Wang, H.**, Feng, D. (2015). Chapter 2: Coating Materials to Increase Pavement Surface Reflectance. Eco-efficient Materials for Mitigating Building Cooling Needs: Design, Properties and Applications.
- **Wang, H.**, Zhong, J., Feng, D., Meng, J., Xie, N. (2012). Nanoparticles-Modified Polymer-Based Solar-Reflective Coating as a Cooling Overlay for Asphalt Pavement. International Journal of Smart and Nano Materials, iFirst, 2012,1-10.

### **Presentation/ Poster**

- **Wang, H.**, Buttlar, W.G. (2018). Modern, Recycled SMA Mixtures on the Illinois Tollway and Preliminary Performance-based Mix Design Approach, 93<sup>rd</sup> AAPT Annual Meeting and Technical Sessions.
  - **Wang, H.**, Rath, P., Buttlar, W.G. (2018). Recycled Asphalt Shingle Modified Asphalt Mixture Design and Performance Evaluation. Transportation Research Board, 2018.
  - **Wang, H.** (2015). Laboratory Evaluation of Slag and Non-Slag FRAP RAS Mixtures with High Asphalt Binder Replacement. T&DI International Airfield & Highway Pavements Conference 2015.
  - **Wang, H.** (2013). Solar-reflective Coating as a Cooling Overlay for Asphalt Pavement. 2nd International Transportation PhD Student Symposium.
  - **Wang, H.** (2012). Evaluation of High Temperature Performance of Nano Hollow Sphere Modified Asphalt Binder. The 20th Annual International Conference on Composites or Nano Engineering.
  - **Wang, H.** (2011). Solar-reflective Coating as a Cooling Overlay for Asphalt Pavement. Third International Conference on Smart Materials and Nanotechnology in Engineering.
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