

## IACIP NEWSLETTER NO.1, JUNE 2016



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# International Association of Chinese Infrastructure Professionals

## 1. Preface

The International Association of Chinese Infrastructure Professionals (IACIP) is registered as a non-profit professional organization with its headquarter in the United States. The mission of IACIP is to facilitate the advancement of knowledge and technology in the areas of Civil Infrastructure and Systems through education, technology transfer, and research at an international level. Under the leadership of past presidents and the great efforts of the board with the strong support from the association members and a few collaborating organizations, the association has grown fast and organized a series of workshops, conferences, Wechat discussions, and other activities since its inauguration. To further grow our association, we decide to launch this newsletter. It is also part of our plan to normalize the operation procedure and promote our association. This newsletter will document the development of the association, serve as a window to display achievements of our association and members, provide a channel of communication between our association and members, share recent advances in infrastructure research (including abstracts of recent Ph.D. dissertations) and the information on the infrastructure-related activities and events, serve our members, and promote our association and members to the public. I am sure that you will find this newsletter is informative and useful. I believe this newsletter will be enhanced with time and become an important resource for our association. I encourage our members and friends to provide us useful technical and non-technical information to be included on this newsletter. I appreciate the board's support, the editor and editorial team's hard-working, and your great help for this valuable endeavor. Enjoy reading this newsletter.

Sincerely yours,

Jie Han, Ph.D., PE, ASCE Fellow

President of IACIP

## 2. Background of IACIP

The International Association of Chinese Infrastructure Professionals (IACIP) is a US registered non-profit professional organization with its members working or studying in the fields of Civil Infrastructure and Systems (CIS) and related areas who are interested in CIS development and related issues. A group of such professionals met several times either individually or as groups during the Transportation Research Board (TRB) 89th Annual Meeting at Washington DC, January 2010. They were, in alphabetical order, Fang, Yingwu; Huang, Baoshan; Han, Jie; Wang, Linbing; Wang, Kelvin; Wu, Chung; Zhang, “Doc” Zhongjie; and Zhang, Zhanmin. The group discussed the needs for an organization to focus on the infrastructure area and the potentials for its development. As the result, a consensus had been reached to initiate the process of establishing the IACIP. After several months of consultation and discussion, the Board of IACIP was established under the coordination of Dr. Doc Zhang and Dr. Linbing Wang and its inaugural board members and their affiliations are listed as follows (in alphabetical order):

Fang, Yingwu, Virginia Department of Transportation  
Huang, Baoshan, University of Tennessee  
Han, Jie, University of Kansas  
Lin, Guoming, WPC Inc-Terrocon Company  
Shen, Shihui, Washington State University  
Tao, Mingjiang, Worcester Polytechnic Institute  
Wang, Linbing, Virginia Polytechnic Institute and State University  
Wang, Kelvin, Oklahoma State University  
Wu, Chung, Virginia Department of Transportation  
Xiao, Ming, California State University-Fresno  
Yu, Xiong, Case Western Reserve University  
Zhang, “Doc” Zhongjie, Louisiana Department of Transportation/Louisiana  
Transportation Research Center  
Zhang, Xiong: University of Alaska-Fairbanks  
Zhang, Zhanmin, University of Texas at Austin

IACIP is an association governed by its Board of Directors and has the officials of president, vice presidents, chairs of six committees, and secretary. The membership of the association includes members, student members, honorary members, and organization/corporate Members. This organization aims to provide such a forum and platform that each participant can have a better opportunity to collaborate with others in corresponding professional areas. Therefore, IACIP, through its members, gathers and disseminates information for Civil Infrastructure professionals and facilitates the advancement of knowledge and technology in the areas of Civil Infrastructure and

Systems through education, technology transfer, and research at an international level. The vision of IACIP is to be one of the leading professional organizations in Civil Infrastructural Engineering worldwide.

IACIP held its inauguration at its first annual workshop co-chaired by Drs. Linbing Wang, Xudong Wang and Yingwu Fang, which was sponsored by the Research Institute of Highways of China during the TRB 90th Annual Meeting at Washington DC, January 2011. Dr. Doc Zhang served as the first president from January 2011 to January 2013, Dr. Linbing Wang served as the second president from January 2013 to June 2014, and Dr. Yingwu Fang served as the third president from June 2014 to January 2016. The current president is Dr. Jie Han and his term started in January 2016 and will end in January 2017.

After the inauguration of IACIP, IACIP has cooperated and will continue cooperating with other professional organizations to host, sponsor, and promote activities and events that meet our organizations goals and objectives.

### 3. 2016 IACIP board and committee members

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#### **Board**

President: Prof. Jie Han, the University of Kansas

Vice President: Dr. Chung Wu, Virginia Department of Transportation

Vice President: Prof. Xiong “Bill” Yu, Case Western Reserve University

Immediate Past President: Dr. Yingwu Fang, Virginia Department of Transportation

Treasurer: Prof. Shihui Shen, Pennsylvania State University

Secretary: Prof. Mingjiang Tao, Worcester Polytechnic Institute

Founding President: Dr. Zhongjie “Doc” Zhang, Louisianan Transportation Research Center

Past President: Prof. Linbing Wang, Virginia Tech

Member: Prof. Lu Gao, the University of Houston

Member: Prof. Baoshan Huang, the University of Tennessee

Member: Dr. Shin-Che Huang, independent consultant

Member: Prof. Xianming Shi, Washington State University

Member: Prof. Kelvin Wang, Oklahoma State University

Member: Prof. Haifang Wen, Washington State University

Member: Prof. Zhanping You, Michigan Technological University

Member: Prof. Zhanmin Zhang, the University of Texas at Austin

Member: Prof. Xiong Zhang, the University of Cincinnati

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#### **Founding Committee**

Chair: Dr. Zhongjie “DoC” Zhang, Louisianan Transportation Research Center (LTRC)

Member: Dr. Yingwu Fang, Virginia Department of Transportation

Member: Prof. Jie Han, the University of Kansas

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Member: Prof. Baoshan Huang, the University of Tennessee  
Member: Prof. Kelvin Wang, Oklahoma State University  
Member: Prof. Linbing Wang, Virginia Tech  
Member: Dr. Chung Wu, Virginia Department of Transportation  
Member: Prof. Zhanmin Zhang, the University of Texas at Austin

#### **Bylaws Committee**

Chair: Prof. Zhanmin Zhang, the University of Texas at Austin.  
Member: Prof. Shihui Shen, Pennsylvania State University.  
Member: Prof. Mingjiang Tao, Worcester Polytechnic Institute.

#### **Nomination Committee**

Chair: Prof. Baoshan Huang, the University of Tennessee.  
Member: Dr. Chung Wu, Virginia Department of Transportation.  
Member: Prof. Kelvin Wang, Oklahoma State University

#### **Strategic Planning Committee**

Interim Chair: Dr. Chung Wu, Virginia Department of Transportation  
Member: Prof. Xiong Zhang, the University of Cincinnati  
Member: Prof. Junliang Tao, the University of Akron

#### **Annual Activities Committee**

Chair: Prof. Haifang Wen, Washington State University  
Member: Prof. Hao Wang, Rutgers University  
Member: Prof. Qing Lu, University of South Florida  
Member: Prof. Xinbao Yu, the University of Texas at Arlington

#### **Public Relation Committee**

Chair: Prof. Zhanping You, Michigan Technological University  
Member: Prof. Juanyu “Jenny” Liu, University of Alaska Fairbanks  
Member: Prof. Hui Li, Tongji University, China  
Member: Prof. Xuelian Li, Changsha University of Science & Technology

#### **Fundraising Committee**

Chair: Prof. Xianming Shi, Washington State University  
Member: Prof. Zhanping You, Michigan Technological University  
Member: Dr. Yingwu Fang, Virginia Department of Transportation

#### **Membership Committee**

Chair: Prof. Lu Gao, the University of Houston  
Member: Prof. Pan Lu, North Dakota State University  
Member: Mr. Zhe Han, the University of Texas at Austin

## 4. IACIP completed activities up to date

Activity	Location and Time	Organizer	IACIP's Role	IACIP Coordinator
<b>First US-China Workshop on Research and Education Collaboration in Transportation Infrastructure – IACIP Inauguration</b>	Washington DC, USA Jan. 23, 2011	IACIP and Research Institute of Highway Ministry of Transport of China	Organizer	Dr. Linbing Wang
<b>The 24th ICTPA Annual Conference &amp; NACGEA International Symposium on Geo-Trans</b>	Los Angeles, USA May 27-29, 2011	International Chinese Transportation Professionals Association	Co-sponsor	Dr. Ming Xiao
<b>International Workshop on Practical Solutions to Geotechnical Problems in Pavement Engineering*</b>	Shanghai, China June 2 to 4, 2011	Tongji University and IACIP	Co-organizer	Dr. Jie Han Dr. Zhongjie Zhang
<b>International Symposium on Pavement and Geotechnical Engineering for Transportation Infrastructure</b>	Nanchang, Jiangxi, China June 5 - 7, 2011	IACIP and the Nanchang University of Aerospace Technology	Co-organizer	Dr. Baoshan Huang
<b>Second US-Asia Workshop on Research and Education Collaboration in Transportation Infrastructure</b>	Washington DC, USA Jan. 22, 2012	IACIP	Organizer	Dr. Chung Wu Dr. Yingwu Fang
<b>International Symposium on Safe, Energy-efficient, and Environmentally Friendly Transportation Infrastructure</b>	Inner Mongolian, China, July 20-22, 2012	Inner Mongolian Department of Transportation	Co-sponsor	Dr. Linbing Wang Dr. Jie Han
<b>International Symposium on Geotechnical Engineering for High-speed Transportation Infrastructure</b>	Hangzhou, China October 26 to 31, 2012	Zhejiang University	Co-sponsor	Dr. Xiong Yu Dr. Jie Han
<b>Third IACIP Workshop on Research and Education Collaboration in Transportation Infrastructure</b>	Washington DC, USA Jan. 13, 2013	IACIP	Organizer	Dr. Xiong "Bill" Yu
<b>8<sup>th</sup> International Conference on Road and Airfield Pavement Technology (ICPT2013)</b>	Taipei, Taiwan, July 14 – 18, 2013	Chinese Society of Pavement Engineering (CSPE)	Co-organizer	Dr. Chung Wu
<b>International Symposium of Climatic Effects on Pavement and Geotechnical Infrastructure</b>	Fairbanks, Alaska, USA, August 4-7, 2013	Alaska University Transportation Center	Co-organizer	Dr. Jenny Liu Dr. Xiong Zhang
<b>Fourth IACIP Workshop on Research and Education Collaboration in Transportation Infrastructure</b>	Washington DC, USA Jan. 11, 2014	IACIP	Organizer	Dr. Ming Xiao
<b>GeoShanghai International Conference 2014</b>	Shanghai, China May 26 to 28, 2014	Tongji University	Co-organizer	Dr. Xiong Zhang
<b>Fifth IACIP Workshop on Innovation and Advancement in Transportation Infrastructure Technologies</b>	Washington DC, USA Jan. 11, 2015	IACIP	Organizer	Dr. Shihui Shen
<b>International Symposium on Systematic Approaches to Environmental Sustainability in Transportation</b>	Fairbanks, Alaska, August 2-5, 2015	Center for Environmentally Sustainable Transportation in Cold Climates (CESTiCC) and Tongji University	Co-organizer	Dr. Jenny Liu Dr. Xiong Zhang
<b>9<sup>th</sup> International Conference on Road and Airfield Pavement Technology</b>	Dalian, China, August 9-13, 2015	Int. Committee on Road & Airfield Pavement Technology, Dalian Univ. of Technology & China Highway & Transportation Society	Co-sponsor	Dr. Yingwu Fang
<b>Fifth IACIP Workshop on Asia-US Infrastructure Technology Forum**</b>	Washington DC, USA Jan. 10, 2016	IACIP	Organizer	Dr. Haifang Wen
<b>Transportation Research Congress (TRC)</b>	Beijing, China, June 6-8, 2016	TRC Organizing Committee	Co-sponsor	Dr. Linbing Wang





**\*International Workshop on Practical Solutions to Geotechnical Problems in Pavement Engineering, Shanghai, China, June 2 to 4, 2011**

**\*\*2016 IACIP Annual Workshop and Banquet**



**Yinwu Fang (IACIP President)**



**Prof. Jie Han (IACIP President) at Banquet**



**Announcement of Student Poster Award Recipients**



**Banquet at Tony Cheng's Seafood Restaurant**

## 5. Major awards and honors received by IACIP members

- Dr. Linbing Wang, IACIP former president, has been recognized by the Office of the Vice President for Research and Innovation of Virginia Tech, for his work to create sustainable roads and highways. <https://www.research.vt.edu/scholar-of-the-week/linbing-wang>. The Scholar-of-the-week program at Virginia Tech recognizes Virginia Tech professors with excellence and high impact of research. In May 2016, Dr. Wang was appointed as the Director of the Center for Smart and Green Civil Systems at Virginia Tech. More recently (June 2016) Dr. Wang is appointed as one of the seven international experts to serve on the Expert Task Group (ETG) of the China Highway & Transportation Society. The ETG is comprised of recognized researchers and leaders and is chaired by Prof. Jianlong Zheng, member of the China NAE. Also in June, Dr. Wang has successfully chaired together with Dr. Dongbai Sun, Dr. Qingbin Li and Dr. David Frost the International Workshop on Genome of Stone-based Civil Infrastructure Materials. The workshop is sponsored by the US National Science Foundation, the National Center for Materials Service Safety, and Tsinghua University.

A group of IACIP members led by Dr. Linbing Wang have actively participated in the organization of the first Transportation Research Congress (TRC), a conference jointly sponsored by multiple research institutions. The first TRC is a very successful event that has attracted more than 1000 attendees with more than 250 presentations.

- A research project which Dr. Xianming Shi completed in 2014 for the New Mexico Department of Transportation as Co-Principal Investigator was selected as one of the AASHTO 2016 Sweet Sixteen High Value Research Projects, *Optimization of Elastic Polymer Modification Rates Based on Contemporary Relative Costs vs. Benefits*.
- Winners of 2016 IACIP Student Poster Awards:

**1st Prize:** Minghui Gong (Southeast University)

**2nd Prize:** Huayang Yu (The Hong Kong Polytechnic University), Shan Zhao (University of Illinois at Urbana-Champaign)

**3rd Prize:** Kun Zhang (Washington State University), Guangxi Wu (Case Western Reserve University), Fangyuan Gong (Chang'an University), Shun Yao (Chang'an University), and Xiadong Zhou (Chang'an University)



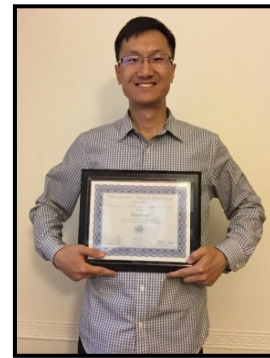
- Prof. Hehua Zhu from Tongji University, China received the prestigious 2015 Humboldt Research Award from the Alexander von Humboldt Foundation in Germany in March 2016. Prof. Zhu is IACIP's close friend, collaborator, and supporter. He was the only scholar from China and the only scholar in the field of civil engineering in the world who received this award in 2015. The Humboldt Research Award was established to honor and recognize top non-German scholars who have made outstanding contributions to their research fields. IACIP congratulates Prof. Zhu on this well-deserved award.



- Gang Xu, P.E. is a WSU Ph.D. candidate working on CESTiCC-sponsored research entitled "Environmentally Friendly Pervious Concrete for Treating Deicer-Laden Stormwater". He received the J.F. Osborn Outstanding Graduate Student award and the Perteet Graduate Fellowship in Civil Engineering today. Gang is also a recipient of the Russ and Anne Fuller Fellowship for Interdisciplinary Research, Scholarship for the 2016/17 academic year.

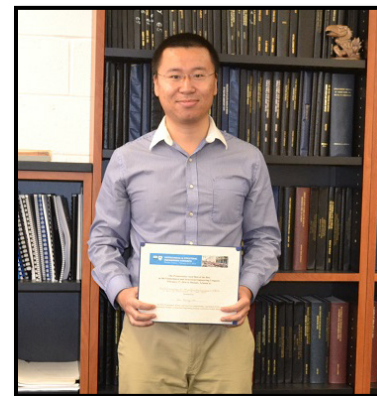


- Chanjuan Han and Yuan Guo are from Case Western Reserve University. They received the Craig J. Miller Memorial Award by the CWRU School of Graduate Studies, which recognize the excellent achievement in civil engineering research.



(Left: Chanjuan Han, right: Yuan Guo)

- Yan Jiang presented a paper titled "Field Evaluation of Secondary Reinforcement Effects on Facing Deflections of MSE Walls" and won the best presentation prize at the ASCE Geotechnical & Structural Engineering Congress (GEO-SEI 2016) held in Phoenix, AZ, February 14-17, 2016. Yan was a Ph.D. student at the University of Kansas under the supervision of Prof. Jie Han and received his Ph.D. degree in May 2016.



## 6. Summary of WeChat discussion

IACIP's two WeChat groups were established by Dr. You Zhanping and Dr. Yingwu Fang in February 2015 on behalf of IACIP. These two WeChat groups were the first ones that attracted Chinese infrastructure professionals all over the world. The Social Activities WeChat Group, managed by Dr. You, has been used for technical exchanges and social activities. The Expert Exchange WeChat Group, managed by Dr. Fang, has been used mainly for professional and technical activities. One of the warmly welcomed activities on the Expert Exchange WeChat Group is the regularly organized Expert Panel Discussions on pavement, geotechnical, and other infrastructure related topics. The following is a list of the Expert Panel Discussions organized so far.

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Date: Saturday, 3/21/2015 (IACIP's Ground Opening of the Expert Panel Discussions)

**Topic: Pavement – Past Success, Current Situation, and Future Development Trends**

Expert Group: Prof. Sun, Lijun; Prof. Huang, Xiaoming; Prof. Tan, Yiqiu; Prof. You, Zhanping

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Date: Saturday, 4/4/2015

**Topic: Criteria and Methods in Evaluation of Asphalt and Modified Asphalt**

Expert Group: Prof. Hao, Peiwen; Dr. Cao, Rongji; Dr. Xie, Hongbin

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Date: Saturday, 4/18/2015

**Topic: Challenges and Opportunities in Functionalization of Pavements**

Expert Group: Prof. Wang, Shengyue; Prof. Han, Sen; Prof. Li, Hui

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Date: Saturday, 5/2/2015

**Topic: Surface Characteristics, Recycling, Construction Techniques, and Maintenance of Cement Concrete Pavements**

Expert Group: Dr. Tian, Bo; Dr. Wu, Chung, Dr. Xiong, Jianping

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Date: Saturday, 5/16/2015

**Topic: Pros and Cons in Semi-rigid Pavement**

Expert Group: Prof. Zha, Xudong; Dr. Hu, Xianguang; Prof. Wen, Haifang

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Date: Saturday, 6/6/2015

**Topic: Pros and Cons in Semi-rigid Pavement**

Expert Group: Dr. Wang, Xudong; Dr. Cao, Rongji; Prof. Wen, Haifang

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Date: Saturday, 6/20/2015

**Topic: Information System of Roadway Construction, Inspection, Maintenance, Management, and the Future Development Trends**

Expert Group: Dr. Wang, Zhongren; Prof. Li, Hui; Prof. Wang, Junhua; Prof. Xu, Zhigang, Prof. You, Zhanping

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Date: Saturday, 7/11/2015

**Topic: MEPDG – Mechanistic-Empirical Pavement Design Guide**

Expert Group: Prof. Wen, Haifang; Dr. Wang, Zhongren; Dr. Fang, Yingwu

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Date: Saturday, 9/12/2015
<b>Topic: Differences in Asphalt Technologies between China and Other Countries</b>
Expert Group: Prof. Sun, Lijun; Dr. Wang, Xudong; Dr. Wang, Lin; Dr. Cao, Rongji; Prof. Shen, Shihui; Prof. Wen, Haifang; Dr. Wang, Hao; Dr. Xie, Hongbin
Date: Saturday, 10/10/2015
<b>Topic: Characteristics and Performance of Warm Mix Asphalt</b>
Expert Group: Prof. Wen, Haifang; Prof. Huang, Xiaoming; Prof. You, Zhanping; Dr. Xie, Hongbin; Prof. Zhang, Jinxi
Date: Saturday, 10/24/2015
<b>Topic: Roadway Materials and the Challenges and Opportunities</b>
Expert Group: Prof. Chen, Huaxin; Prof. Sheng, Yanping; Prof. You, Zhanping; Prof. Yu, Xiong; Dr. Wu, Chung
Date: Saturday, 11/14/2015
<b>Topic: Long Term Performance of Pavements</b>
Expert Group: Dr. Wang, Xudong; Dr. Fang, Yingwu; Dr. Xu, Bing; Dr. Wang, Zhongren; Prof. Yu, Xiong
Date: Saturday, 12/5/2015
<b>Topic: Issues and Challenges I Roadway Widening</b>
Expert Group: Dr. Cao, Rongji; Prof. Huang, Xiaoming; Dr. Zhang, Jingna; Dr. Wang, Hao; Dr. Feng, Zhen; Dr. Yuan, Bo
Date: Saturday, 12/19/2015
<b>Topic: Permeable Pavement, Sponge City, and Development Trends</b>
Expert Group: Prof. Leng, Zhen; Prof. Wang, Yuhong; Prof. Fu, Xinsha; Prof. Lu, Qing; Dr. Bai, Qifeng; Prof. Li, Hui; Dr. Zhang, Keqiang
Date: Saturday, 1/23/2016
<b>Topic: Technology and Research on Influences of Environment on Roadway Engineering</b>
Expert Group: Prof. Lu, Qing; Dr. Zhu, Haoran; Prof. Li, Hui; Prof. Qian, Yu; Prof. Yu Bin
Date: Saturday, 2/27/2016
<b>Topic: Use of Geosynthetics in Roadway and Railway Engineering, and the Development Trends</b>
Expert Group: Prof. Han, Jie; Prof. Xie, Yongli; Prof. Huang, Xiaoming; Prof. Zhang, Xiong; Dr. Qian, Yu
Date: Saturday, 3/19/2016
<b>Topic: Load and Stress Conditions in Pavement Structures and Pavement Mechanics</b>
Expert Group: Prof. Zha, Xudong; Dr. Wang, Xudong; Prof. Huang, Xiaoming; Prof. You, Zhanping; Dr. Fang, Yingwu
Date: Saturday, 4/2/2016
<b>Topic: Asphalt Pavement Recycling Technology</b>
Expert Group: Prof. Hao, Peiwen; Dr. Liu, Hao; Prof. Zou, Guilian; Prof. Shen, Shihui; Prof. You, Zhanping
Date: Saturday, 4/16/2016
<b>Topic: Aging of Asphalt and Its Impact on Asphalt Recycling</b>
Expert Group: Prof. Leng, Zhen; Prof. Wang, Yuhong; Prof. Tan, Yiqiu; Prof. Xiao Feipeng; Prof. Lu, Qing; Dr. Wang, Hao

Date: Saturday, 5/14/2016

**Topic: Intelligent Construction of Asphalt Pavement**

Expert Group: Dr. Cao, Rongji; Dr. Chang, George; Prof. Xu, Guanghui; Dr. Tian, Bo; Ms. Zhang, Lili; Mr. E, Yuhui; Dr. Wang, Dongsheng; Mr. Ge, Zehua

Date: Saturday, 5/28/2016

**Topic: Smart City Technology and Development Trends**

Expert Group: Prof. Dr. Zhang, Lei; Prof. Zhao, Zhenduo; Prof. Xu, Zhigang; Prof. Huang, Xiaoming; Prof. Yu, Xiong; Prof. Yu, Xinbao

Date: Saturday, 6/18/2016

**Topic: Intelligent Compaction and Development Trends**

Expert Group: Dr. Chang, George; Prof. Xu, Guanghui; Dr. Wang, Dongsheng; Mr. E, Yuhui; Mr. Ge, Zehua; MS. Zhao, Xiupu; Ms. Ding, Yinping; Prof. Qiu, Yanjun

Date: Saturday, 7/2/2016

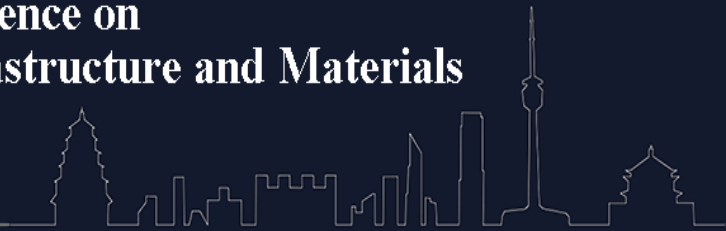
**Topic: Highway Safety Design**

Expert Group: Prof. Guo, Zhongyin; Prof. Fu, Xinsha; Prof. Pei, Yulong; Prof. Xu, Jinliang; Dr. Wang, Zhongren; Dr. Feng, Zhen

## 7. Xi'an conference

### 2016 International Conference on Transportation Infrastructure and Materials

*July 16-18, 2016, Xian, China*



The International Association of Chinese Infrastructure Professionals (IACIP) and Chang'an University will jointly host the 2016 International Conference on Transportation Infrastructure and Materials (ICTIM) in Xi'an, China from July 16 to 18, 2016. This conference would present and discuss recent development and advances in the fields of transportation infrastructure and materials. Prof. Funming Wang (from Zhengzhou University, China), Prof. William Buttlar (from University of Missouri, USA), and Prof. Kelvin Wang (from Oklahoma State University, USA) will be invited as the keynote speakers to give the speech.

See more details at 2016 ICTIM website: <http://ictim2016.chd.edu.cn/>

You are welcome to present your recent work and attend the discussion in the 2016 ICTIM. See you in Xi'an!



## 8. Qingdao conference



The International Association of Chinese Infrastructure Professionals (IACIP) and the Qingdao University of Technology (QUT) will jointly organize the 2017 International Conference on Transportation Infrastructure and Materials in Qingdao, China from June 9 to 12, 2017. You are invited to present your research work and attend this conference.

## 9. IACIP and CESTiCC joint webinar

The International Association of Chinese Infrastructure Professionals (IACIP), working with the Center for Environmentally Sustainable Transportation in Cold Climates (CESTiCC) at the University of Alaska - Fairbanks, jointly delivered a webinar titled “Planning and Preparation for an Academic Career” 10:00 AM-11:00 AM Alaska Time on April 26th, 2016. Panelists of the webinar included Prof. Jie Han, ASCE Fellow, the University of Kansas; Prof. Baoshan Huang, Edwin G. Burdette Professor, the University of Tennessee; Prof. Xiong (Bill) Yu, Case Western Reserve University; and Prof. Jie Huang, the University of Texas at San Antonio.

The webinar was hosted by Prof. Jenny Liu, Director of CESTiCC at the University of Alaska - Fairbanks and moderated by Prof. Zhanping You at Michigan Technological University.

The webinar is the first one of a series of webinars being planned by IACIP, which aims to help students and young professionals to gain insight on the academic jobs and understand what they need to know as they prepare for their academic careers. The panelists shared their experience and thoughts on items such as how academic life is like, how to prepare academic publications and proposals, how to gain experience in teaching, and how to get involved in professional services, etc. The presentations were followed with Q&A. A follow-up webinar on preparation of cover letters and interview for academic jobs will be organized during Fall 2016. Please stay tuned with IACIP announcements.

## 10. Abstracts of Ph.D. dissertations of IACIP or members' students

Title: Polymeric thermochromic material for improvement of asphalt pavement durability

Author: Jianying Hu, Ph.D, Case Western Reserve University

Advisor: Xiong Yu, Ph.D, PE

Sponsorship Agency: NSF and ODOT

Abstract: Asphalt pavements feature good performance and relatively low construction and maintenance costs. However, the black color of asphalt binder implies that the sunlight is not reflected but absorbed, which raises the temperature of the asphalt pavement and impairs its long-term durability. An innovative strategy presented in this dissertation is to use innovative thermochromic material to develop thermochromic asphalt binders with desirable solar reflectance, i.e., they reflect more solar energy at high temperature and reflect less solar energy at low temperature. Comparison measurements have found that the surface temperature of thermochromic asphalt binder is lower than that of the conventional asphalt binder with maximum decrease as high as 6.6 °C during typical summer day in the northeast U.S. (i.e. Cleveland, OH). Besides the cooling effects, study showed that the surface temperature of thermochromic asphalt was higher than regular asphalt under low temperature. The thermal, optical, mechanical, pyrolytical, and chemical properties of the thermochromic asphalt binders were characterized. The thermal performance of the thermochromic HMA was evaluated from long-term field exposure. The results indicated that the effectiveness of the thermochromic HMA could sustain after long term exposure. The dissertation conducted a study to gauge the potential of thermochromic asphalt concrete to improve the durability of the pavement, reduce the environmental impacts, and mitigate ice related safety issues on the road. This demonstrates innovation for development of sustainable and environmental benign infrastructure.

Title: An Innovative Sensing Technology to Measure Thin Interfaces for Geotechnical Applications

Author: Quan Gao, Ph.D, Case Western Reserve University

Advisor: Xiong Yu, Ph.D, PE

Sponsorship Agency: National Science Foundation (CMMI 1131295)

Abstract: Time Domain Reflectometry (TDR) is a very useful and effective technique for the detection of discontinuities or interfaces. It has been extensively applied for geotechnical applications by detecting air-water or soil-water interface, but due to the limited resolution of the traditional straight probe, it would lose capability and effectiveness to measure thin interfaces under certain scenarios.

This dissertation proposed a new spiral TDR sensor, which is to design the waveguide into spiral shape to increase the effective propagation path of electromagnetic wave per unit length along the direction of the sensor. The application on monitoring bridge

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scouring process indicate that the new spiral sensor is much more effective and efficient than conventional straight sensor due to its higher sensitivity and resolution. One important contribution of this dissertation lies in providing an approach for the detection and measurement of water film due to void redistribution, which is essential to understand the mechanism of liquefaction in layered soil. The static and dynamic experiment results reveal that the new spiral sensor is capable to detect and measure the water film within millimeter. This provides insights and inspirations to quantify the water film or extent of void redistribution during the course of liquefaction in layered soils.

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**Title: Analyses and Applications of Thermoelectric Modules: Electrically Parallel and Serial Structures**

Author: Guangxi Wu, Ph.D, Case Western Reserve University

Advisor: Xiong Yu, Ph.D, PE

Sponsorship Agency: National Science Foundation (NSF), Ohio Department of Transportation (ODOT)

Abstract: Conventional thermoelectric modules (TEMs) are composed of n-type and p-type thermoelectric (TE) legs connected electrically in series and thermally in parallel. The development of TE technology based on the traditional TEM structure has been limited by its low efficiency and high cost.

This research analyzes the TE problem from an electrical engineering angle, considering TE legs as current power sources, leading to an alternative TEM structure, where all TE legs are made from single type of TE material and connected in parallel both electrically and thermally.

Experimental, analytical and numerical analysis have been carried out to evaluate the performance of unit modules with the newly proposed electrically parallel structure. It indicates that the modules' figure-of-merit and energy conversion efficiency can be increased within a certain device area limit, the fabrication cost can be decreased, and the power density and mechanical durability can be increased, while the temperature gradient is kept in the cross-plane direction. It can also increase the device lifetime and benefit the back-end DC-DC converter design.

In addition, the electrically parallel structure can also stimulate innovative applications of TEM, because of its simplified multilayered device structure. An innovative TEG energy harvesting system from pavement structures has been implemented and has proved promising to periodically power low energy consumption sensors to monitor civil infrastructure's health in the long-term.

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**Title: Evaluating unsaturated soil behavior using constant water content triaxial tests**

Author: Lin Li, Ph.D, University of Alaska Fairbanks

Advisor: Xiong Zhang, Ph.D, PE

Sponsorship Agency: National Science Foundation, Alaska University Transportation Center, Alaska Department of Transportation & Public Facilities

Abstract: The triaxial test has been extensively used to evaluate both saturated and unsaturated soil behaviors. The conventional triaxial test apparatus for saturated soils cannot be used to test unsaturated soils due to difficulties in soil volume and suction

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measurement. In this study, a new triaxial test system was developed to investigate unsaturated soil behaviors through constant water content triaxial tests. To measure soil suction variation during testing, a new type of high-suction tensiometer was developed. After saturation and calibration, this new type of high-suction tensiometer could be utilized for matric suction measurement on unsaturated soils with a maximum measurable suction up to 1100 kPa. To measure the volume change of unsaturated soils during triaxial testing, a photogrammetry-based method was developed by integrating photogrammetry, optical-ray tracing, and least-square estimation techniques. Through two validation tests on a stainless steel cylinder and a saturated sand specimen, the average point and volume change measurement accuracy were evaluated to be 0.065 mm and 0.05%, respectively. In addition to total volume change measurement, the newly developed photogrammetry-based method can also be used to investigate the deformation characteristics of soils during triaxial testing such as full-field deformation, volumetric strain non-uniformity, full-field strain distribution, and shear band evolution process. To evaluate the performance of the new triaxial testing system, a series of constant water content triaxial tests were carried out on unsaturated soils. Analysis results indicated that the proposed triaxial testing system is cost and time efficient when characterizing unsaturated soils.

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Title: Analyzing Field Performance of Steel-Reinforced HDPE (SRHDPE) Pipes during Installation and under Traffic Loading

Author: Fei Wang, Ph.D, the University of Kansas

Advisor: Jie Han, Ph.D., PE, FASCE

Sponsorship Agency: Kansas Department of Transportation

Abstract: Steel-reinforced HDPE pipe was developed to mitigate the problems of metal (i.e., corrosion) and plastic pipes (i.e., creep and buckling). In the new pipe, steel ribs are included to minimize creep and buckling and plastic covers of ribs are to prevent steel corrosion. This new type of pipe requires field performance data to develop a design method. In this study, field test, numerical modeling, theoretical derivation, and long-time monitoring were conducted to investigate its field performance during installation and under traffic loading. Major contributions of this study can be summarized as follows: (1) the equivalent modulus method and the hardening soil model were adopted in the numerical model to simulate the side fill compaction effect during the pipe installation; (2) partially-mobilized soil arching (i.e., shear stresses at the interface of mobilized and stable portions lower than the shear strength) equations were proposed to understand the load transfer mechanism in the soil cover; and (3) two-year monitoring data indicates the change of the soil arching effect above the pipe and the pipe stiffness with time.

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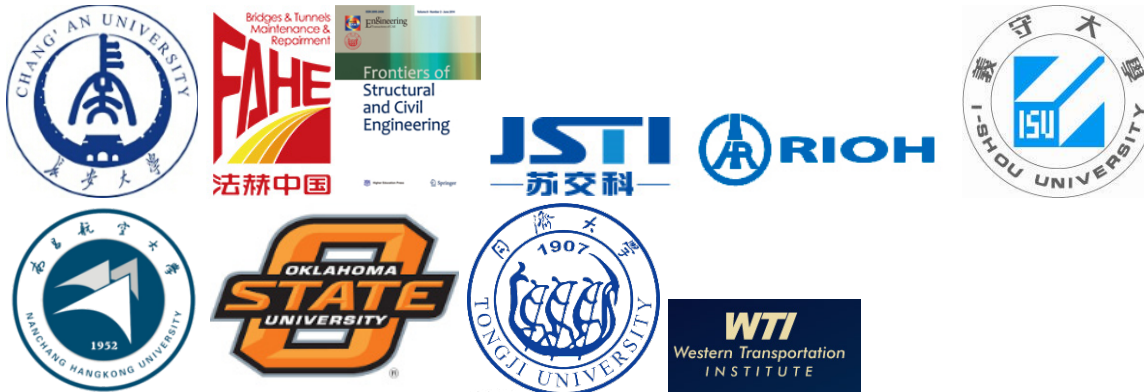
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Prof. Kelvin Wang, Oklahoma State University

Tongji University

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The editors also appreciate IACIP members or friends who have provided the information included in this newsletter.

## 12. Contact

We are soliciting for news and information to be included in future newsletters. Please send your information to Prof. Hui Li at the following email address: [hli@tongji.edu.cn](mailto:hli@tongji.edu.cn).