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Wind Effects on Buildings and Urban Environment

Wind Engineering JURC Joint Seminar
Tokyo Polytechnic University
東京工芸大学 風工学研究拠点

第137回
JURCオープンセミナー
2018年8月29日(水) 10:00～12:30
東京工芸大学 中野キャンパス 1202教室

Inverse Tracking of Indoor and Outdoor Pollutant Sources with Limited Sensor Outputs

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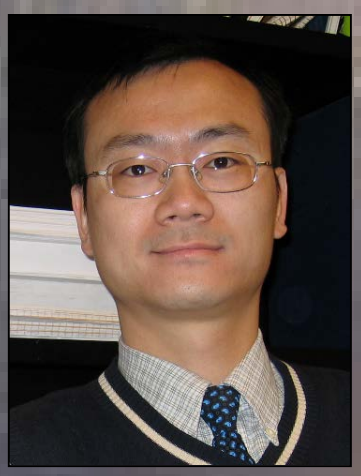

This talk introduces the principles of inverse tracking approaches with a particular focus on a probability concept based inverse modeling method – the adjoint probability method that can identify potential air pollutant sources with limited pollutant sensor outputs.

Biography of Prof. Zhiqiang (John) Zhai

Dr. John Zhai is a Professor in the Department of Civil, Environmental and Architectural Engineering (CEAE) at the University of Colorado at Boulder (UCB). He has a unique and integrated background in both Mechanical and Architectural Engineering with a Doctor degree in Fluid Mechanics (Tsinghua University) and a Ph.D. in Building Technology (MIT). Dr. Zhai has been actively engaged in research activities in the field of fluid/thermal science and building/energy/environment technology since 1994. His particular research interests and expertise include: experimental and numerical study of building thermal and environmental systems; indoor environmental quality; immune and sustainable building design and technology development. As a principal investigator, Dr. Zhai has completed over 50 projects in the areas (including 9 ASHRAE research projects and 3 ASHRAE senior design projects) and published over 150 technical papers in reputed journals and conferences. Dr. Zhai is an active member of ASHRAE, International Building Performance Simulation Association (IBPSA), a Fellow of International Society of Indoor Air Quality and Climate (ISIAQ). He was an invited member for The Committee of Immune Buildings by The US National Academies and The Defense Threat Reduction Agency (DTRA), an invited building expert for National Laboratory Assessment by The US National Academies and National Research Council (NRC), and an invited non-member roundtable speaker by The American Industrial Hygiene Association (AIHA). Dr. Zhai has been serving as Conference Chairs, Advisory/Scientific Committee Members, Track and Session Chairs for many building, energy and environment related conferences and symposiums, and has delivered over 100 talks throughout the world.

Dr. Zhai is an Associate Editor for Energy and Buildings Journal and an Editorial Board Member of Building Simulation International Journal, Journal of Building Physics, Indoor and Built Environment Journal, Journal of Energy, Journal AIMS Energy, as well as invited guest editors for several international journals. Dr. Zhai received the Young Researcher Award (2007) and the Research Development Award (2010) from UCB-CEAE, as well as the University Sustainability Award of Green Faculty (2008). Dr. Zhai was granted the Best Paper Award of International Journal of Building Simulation (2008) and the William Mong Visiting Research Fellowship in Engineering from The University of Hong Kong (2009). He also received the Charles A. and Anne Morrow Lindbergh Foundation Project Award (2007) and the Distinguished Service Award of ASHRAE (2010) and was named Distinguished Lecturer by ASHRAE (2014). Due to his achievements, Dr. Zhai was awarded The “Changjiang (Yangtze River) Scholar” Chair Professor Title by the Ministry of Education, China in 2016 (only four scholars received this title so far in the building HVAC field). His new development in urban pollution source tracking system received The Gold Award of New Product & Technology in The 2016 World Internet of Things (IoT) Conference and Exposition, as well as the Best Paper Award of International Journal of Building Simulation (2018) and the Fellowship for Research by the Japan Society for the Promotion of Science (2018).