

Proposed Synopsis for Talk at Leibniz University



Speaker: Chul-Woo Kim

Professor
Infrastructure Innovation Engineering Laboratory
Department of Civil and Earth Resources Engineering
Graduate School of Engineering
Kyoto University, JAPAN

Title: Opportunities and challenges in bridge health monitoring

Synopsis:

The Japanese infrastructure is about 8 trillion dollar investments, defined broadly to include road systems and bridges, water distribution systems, water treatment plants, power distribution systems, telecommunication network systems, commercial and industrial facilities, etc. In spite of the enormous investments made in these systems and their importance to the Japanese economy, they are in a significantly deteriorated state. Sensing technologies, data modeling and mining approaches, advanced visualization and decision support can be deployed to improve the performance and reduce the life-cycle cost and societal impacts of all life-cycle phases of facilities and infrastructure systems.

The Infrastructure Innovation Engineering Laboratory at Kyoto University are conducting researches on what actionable information about the condition and usage of bridge structures is needed and how best to capture, model and reason about it so as to improve the maintenance and operation of bridges. In this talk, a brief overview of the ongoing researches in Kyoto University, and then present more details about several projects: 1) the use of system parameters of a linear dynamic system as a damage-sensitive feature and feasibility investigation through laboratory and on-site experiments; 2) the research we have done to explore the use of vehicles as a means to detect changes in scaled model bridges and in numerically modeled bridges; 3) Bayesian approaches to emphasize changes in structural integrity and reduce influences from temperature change and traffic loading in the long-term bridge health monitoring (BHM) utilizing traffic-induced vibrations.

Biography:

Dr. Chul-Woo Kim is the professor of Infrastructure Innovation Engineering Laboratory of Civil and Earth Resources Engineering at Kyoto University. He has been the professor of Kyoto University since 2009. Kim's research and teaching interests are oriented toward applications of vehicle-bridge interactive system to BHM; applications of sensors and sensor systems to civil infrastructure condition assessment; application of data mining and machine learning techniques for infrastructure management problems; developing countermeasures against environmental vibration caused by bridge vibrations; structural reliability and performance-based design; seismic performance of viaducts under traffic loadings.

He was one of the first researchers in the field of vehicle-based structural health monitoring so called indirect monitoring. In addition to the indirect monitoring, he is an expert in the direct monitoring, reliability and optimization of structural systems, bridge vibrations, and seismic responses. In addition to his researches, he consults with municipalities both in Japan and abroad about managing their infrastructure. He currently serves as the chair person of "Strategic Technical Committee on Bridge Health Monitoring" in the Kansai chapter of Japanese Society for Civil Engineers (JSCE), and he is a vice-chair of the technical committee on "Structural Health Monitoring and Decision Making" in the JSCE. He also serves as a working group member of IFIP TC7 WG 7.5 on Reliability and Optimization of Structural Systems and a committee member for International Society of Weigh-in-Motion. Kim has published his researches in over 300 Journal and conference papers. One book and 7 book chapters.