MECHANICAL ENGINEERING—ENGINEERING MECHANICS

Graduate Seminar Speaker Series

Proudly Presents:

Homin Song, PhD

Argonne National Laboratory

Homin Song is currently a Postdoctoral Researcher at Argonne National Laboratory. He received his Ph.D. degree from the University of Illinois at Urbana-Champaign in 2019 after receiving his B.S. degree in 2011 from Hanyang University and his M.S. degree in 2013 from Korea Advanced Institute of Science and Technology (KAIST), all in Civil Engineering. Homin's research interest is in nondestructive evaluation (NDE) and structural health monitoring (SHM) based on ultrasonic wave motion. Homin has a broad spectrum of expertise that encompasses the following topical areas of NDE/SHM: advanced ultrasound sensing technology, signal/data processing, numerical modeling, and experimental solid mechanics. His recent postdoctoral research aims at developing a super-resolution noncontact ultrasonic array imaging technique via deep learning. He was the recipient of the Student Best Paper Award from the 2017 International Workshop on Structural Health Monitoring, Student Award for Research on NDT from American Concrete Institute, and Outstanding Paper Award from the Korean Society of Civil Engineers.

Invited by: Andrew Barnard

Thursday, January 23, 2020

4:00 pm — 103 EERC

"Full-field high-resolution ultrasonic imaging for nondestructive evaluation and structural health monitoring"

Nondestructive evaluation (NDE) and structural health monitoring (SHM) systems are essential for today's modern structures to ensure their long-term performance and reduced maintenance cost. The talk will present two full-field high-resolution ultrasonic imaging approaches to detect, image, and characterize internal damage in various materials and structural elements. The first approach is a near-field imaging technique via noncontact ultrasonic scanning measurements. Development of novel ultrasonic scanning hardware, numerical and experimental wave mechanics study to understand complicated wave scattering, and wavefield data processing are presented. A unique application of the developed approach to large-scale concrete structures under realistic damage-promoting environments is also presented. The second approach is a far-field imaging technique based on deep learning. A novel hierarchical multi-scale deep learning approach designed to image subtle structural defects is presented. The results are compared with those obtained by a widely accepted high-resolution imaging technique, Time-reversal MUSIC.