

CNDE Webinar Presentation

December 5, 2024 - 10:00 a.m. CST

This webinar will be recorded and made available on the CNDE website



Generation of Higher Harmonics and their Application to Material Characterization

Presented by:

Laurence J. Jacobs

Senior Vice President Provost Education and Learning
Professor, Civil & Environmental Engineering and Mechanical Engineering
Georgia Institute of Technology

Abstract:

Predictive health monitoring will require the development of advanced sensing techniques capable of providing quantitative information on the damage state of structural materials. Second harmonic generation techniques can measure absolute, strength-based material parameters which can be coupled with uncertainty models to enable accurate and quantitative life prediction. Starting at the material level, this talk will examine a combination of sensing techniques and physics-based models to characterize damage in metals. These second harmonic techniques are acoustic wave based, so component interrogation can be performed with bulk, surface and guided waves using the same underlying material physics. The talk will consider applications to characterize fatigue damage, thermal embrittlement, irradiation damage and sensitization.

Speakers:

Laurence J. Jacobs is Senior Vice Provost Education and Learning at the Georgia Institute of Technology, and Professor of Civil and Environmental Engineering and Mechanical Engineering. He has previously served as Associate Dean for Academic Affairs and Interim Dean of Georgia Tech's College of Engineering. Dr. Jacobs received his PhD in Engineering Mechanics from Columbia University and joined the faculty of Georgia Tech in 1988. Prior to receiving his Ph.D., he worked for two years in the aerospace industry and for one year as a structural engineer. Professor Jacobs' research focuses on the development of quantitative methodologies for the nondestructive evaluation and life prediction of structural materials. This includes the application of nonlinear ultrasound for the characterization of fatigue, creep, stress-corrosion, thermal embrittlement and radiation damage in metals. His work in cement-based materials includes the application of linear and nonlinear ultrasonic techniques to quantify microstructure and progressive micro-cracking in concrete. Dr. Jacobs' publications have been cited more than 11,000 times with an h-index of 56 (Google Scholar) or 45 (Web of Science). Professor Jacobs' research has been funded by US Department of Energy (DOE), National Science Foundation (NSF), Office of Naval Research (ONR), Air Force Office of Scientific Research (AFOSR), Defense Advanced Research Projects Agency (DARPA), NASA, US Department of Transportation (DOT), Georgia DOT, Exxon-Mobil, Electric Power Research Institute (EPRI), Sandia National Labs (SNL), Advanced Research Projects Agency-Energy (ARPA-E) and GE Power Systems. Dr. Jacobs has graduated 20 PhD students and 65 MS thesis students. He is a Fellow of the American Society of Mechanical Engineering (ASME) and won the 2024 ASME Founders Award and the SPIE 2019 NDE Lifetime Achievement Award.

To view live:

Please click this URL to start or join. Participant ID: Shown after joining the meeting

<https://iastate.zoom.us/j/92204384108?pwd=gSLQhpwTiiibV5mefZKnHqKaV6ddxW.1>

International numbers available: <https://iastate.zoom.us/u/abtVXqhELB>

A copy of the recorded webinar will be posted at: <https://www.cnde.iastate.edu/>

Distribution Statement A. Approved for public release: distribution is unlimited.