SESSION 3  
TUESDAY, AUGUST 27 | 2:30 PM - 3:30 PM

3D – Mechanical Measurements |  
NIST Vibration Calibrations of Accelerometers from 0.2 Hz to 20 kHz  
Dr. Richard Allen, National Institute of Standards and Technology (NIST)

Abstract:  
In 2013, NIST restarted its accelerometer vibration calibration service, after having retired three legacy systems, each of which was developed in-house in the 1970s – 1990s. The performance and reliability of these legacy systems no longer met our customers’ requirements. These three systems combined provided primary or secondary calibration over the frequency ranges of 2 Hz – 160 Hz (primary), 100 Hz – 10 kHz (secondary), and 10 kHz – 20 kHz (primary). These systems were replaced by a single, commercial system capable of providing primary calibration over the range of less than 1 Hz through greater than 40 kHz. The new service was introduced in 2013, initially provided calibrations of sensitivity over the frequency range of 10 Hz – 20 kHz with total uncertainties improved by a factor of at least two over all frequency ranges. In this paper I will describe the steps taken to extend the service to cover the range of 0.2 Hz – 20 kHz and how we are preparing for our calibrations to also include phase as well as frequencies in excess of 20 kHz. I will also detail how use of a commercial system provided significant advantages – and challenges – in implementing the calibration service and determining the related uncertainties.

Learning Objectives:  
1. Motion metrology as measured using accelerometers.  
2. Determination of measurement uncertainty for a commercial system.  

Instructor Curriculum Vitae (CV):  
Richard A. Allen is a physicist in the Quantum Measurement Division of NIST's Physical Measurement Laboratory.