CIVIL AND ENVIRONMENTAL ENGINEERING

UCONN | COLLEGE OF ENGINEERING

School of Civil and Environmental Engineering

Structures and Applied Mechanics Seminar Series

Present

Vibration Attenuation and the Modification of System Dynamics using Nonlinear Rotational Inertial Mechanisms

Speaker:

Nicholas Wierschem, Ph.D.
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University of Tennessee Knoxville

Rotational inertial mechanisms (RIMs), which convert linear motion into the rotational motion of a flywheel, can generate substantial mass effects despite having relatively small physical mass. Linear RIMs, often referred to as inerters, produce a constant mass effect in systems that is proportional to the relative acceleration between the two terminals of the RIM. Because of the constant effective mass they produce, linear RIMs have been studied for their potential to be used to improve the performance of structural control devices, such as the tuned mass damper. In contrast to linear RIMs, nonlinear RIMs produce mass effects that are not constant. Some types of nonlinear RIMs produce mass effects that can continuously vary during the response of the structure it is attached to; these nonlinear RIMs can be used to disrupt the formation of resonant behavior. Another type of nonlinear RIM has flywheels that can engage or disengage from the structure using a clutch mechanism. These nonlinear RIMs can be used to irreversibly extract energy from a structure. This presentation will provide an overview of linear and nonlinear RIMs, how these devices can be physically realized, and the recent work in Dr. Wierschem' s research group to evaluate how these devices can be used to modify system dynamics and attenuate vibration.

Friday, December 06, 2024

12:20 – 1:10 PM

CAST 204

Bio: Dr. Nicholas E. Wierschem is an Associate Professor in the Department of Civil and Environmental Engineering at the University of Tennessee. Dr. Wierschem graduated from the University of Arizona in 2007 with a B.S. in Civil Engineering and from the University of Illinois in 2010 and 2014 with a M.S. and Ph.D. in Civil Engineering. Dr. Wierschem's research interests include Structural Control, Structural Dynamics, Earthquake Engineering, and Nonlinear Dynamics.