

Institute Lecture



Prof. Alper Erturk

Georgia Institute of Technology

Dynamics of Next-Generation Smart/Meta Structures: Energy Harvesting, Bio-Inspiration, & Vibration Mitigation



@ 6.15 pm | Friday, August 09, 2019
Venue: L17, LHC

About the talk

Energy harvesting from dynamical systems offers the possibility of enabling self-powered wireless electronic components, such as low-power sensors to be used in a plethora of current and future applications of the Internet of Things, from wearable electronics to civil structures. This talk will exemplify the exploitations of nonlinear dynamic phenomena for frequency bandwidth enhancement of smart and meta-structures with applications in energy harvesting, bio-inspired actuation, elastic wave guiding and vibration attenuation. In all cases we use piezoelectricity as the transduction mechanism due to high power density and ease of application. Next, examples of airflow energy harvesting by leveraging aeroelastic flutter and nonlinear limit cycle oscillations under axial flow will be summarized.

Efforts on the hydroelastic multifunctional problem of bio-inspired underwater swimmer - energy harvester platforms will be discussed. We will also consider the harvesting of structure-borne propagating waves as well as acoustic waves, along with the use of gradient-index phononic crystal lens concepts for wave focusing to enhance the harvested energy. Finally, our efforts on establishing locally resonant metastructures for vibration suppression will be presented. Our ongoing efforts on programmable metastructures as well as opportunities in leveraging nonlinear circuits will be summarized.

About the speaker

Prof. Alper Erturk is the Woodruff Professor of Mechanical Engineering at Georgia Tech. His research program is centered on the intersection of smart structures and dynamical systems. He is recipient of various awards including NSF CAREER Award in Dynamical Systems, ASME Gary Anderson Award, ASME C.D. Mote Jr. Early Career Award and also the SEM James W. Dally Young Investigator Award for research excellence in experimental mechanics. He is an Associate Editor for Smart Materials & Structures (IOP), Journal of Intelligent Material Systems & Structures (SAGE), Journal of Vibration & Acoustics (ASME), and Journal of Energy Engineering (ASCE). He is currently an Elected Member of the ASME Adaptive Structures & Material Systems and Fellow of the ASME.

All are invited to attend

Dean of Research and Development