*Structural Engineering Seminar Series*

*CEE 595 S*

# Mechanics of architected materials: fracture, shocks, and data-driven techniques for structure-property correlation


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## Abstract:

Lightweight architected materials such as cellular solids and micro-lattices are known for their unique mechanical, thermal, and acoustic properties. It has been established that by tuning material architecture, a combination of topology and solid distribution, one can design new material systems, also known as metamaterials, with superior performance compared to conventional monolithic solids. Despite the continuously growing complexity of synthesized microstructures, mainly enabled by developments in additive manufacturing, correlating their morphological characteristics to the resulting material properties has not advanced equally. In this talk we will discuss our recent work on: (a) the brittle failure of 3D lattice metamaterials under tensile and compressive loads, (b) the impact-induced shock dynamics of architected materials and (c) a data-driven framework that connects the effective stiffness of cellular metamaterials to key morphological characteristics.


## Bio:

Stavros Gaitanaros received his PhD in Engineering Mechanics from the University of Texas at Austin in 2014 working at the Center for Mechanics of Solids, Structures and Materials. He then joined Massachusetts Institute of Technology as a Postdoctoral Associate in the Department of Biological Engineering. In 2015 he became an Assistant Professor in the Department of Civil and Systems Engineering at Johns Hopkins University where he leads the Extreme Mechanics of Architected Materials group and is also affiliated with the Hopkins Extreme Materials Institute (HEMI) and the Johns Hopkins Center for Additive Manufacturing and Architected Materials ($JAM^2$).

He is a recipient of the IUTAM Bureau Prize for a Young Investigator in Solid Mechanics. He currently serves as Chair of the ASCE-EMI Technical Committee on Architected Materials and as vice-Chair of the ASME-AMD Technical Committee on Instabilities in Solids and Structures.

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1310 Yeh Student Center