Design with Topology Optimization - From Material Architectures to Structural Systems

Jamie Guest

Associate Professor of Civil Engineering
Johns Hopkins University

Monday, December 3, 2012
12pm-1pm
458 Richards Hall

Abstract

Topology optimization has long been touted as a powerful design tool capable of discovering innovative structural solutions. It has been used to design 'structures' defined at a range of length scales, from tens of microns to decameters, for performance properties governed by a range of mechanics, most notably solid and fluid mechanics. While topology optimization has made strong inroads as a design tool for mechanical components and devices, its use as a design tool for materials and structural systems has progressed at a slower pace. This is largely due to the fact that topology optimized solutions are typically suboptimal when considering real-world operating conditions and manufacturing/construction processes. This talk will review the topology optimization methodology and discuss our efforts at overcoming these shortcomings. The ideas will be presented in the context of multifunctional material architecture design, with extensions to design of building systems also discussed.

Bio

Jamie Guest is an Associate Professor of Civil Engineering at Johns Hopkins University. His research group develops topology optimization algorithms for applications defined at a number of length scales, from material architectures to devices to structural systems. He received his PhD from Princeton University and BSE from University of Pennsylvania, both in Civil Engineering.