Structural Engineering Seminar Series

CEE 595 S

Improving material efficiency in buildings-scale structures using topology optimization

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Abstract:
The construction industry is responsible for 10% of Carbon emissions globally, most of which comes from the manufacturing of construction materials. These greenhouse gas emissions could be reduced if we improved the material efficiency of our buildings. Structural optimization has been suggested as a computational design method that could better utilize the materials we use in the built environment, and help reduce construction's Carbon footprint. Topology optimization is a powerful free-form optimization method that has already been used in mechanical and aerospace applications, but has yet to be widely implemented in construction. This presentation will examine how topology optimization can be used on buildings-scale structures, with a focus on reinforced concrete design. The computational methods will be described, and experimental data from fabricated test specimen will be shared that illustrate the performance gains possible in this field.

Bio:
Jackson Jewett is an assistant professor in the Civil and Environmental Engineering department at Northwestern University. His research focuses on developing computational methods to improve the efficiency and performance of large-scale structures. He is especially interested in how optimization techniques can be adapted for specific materials and fabrication systems. Jackson completed his PhD and postdoctoral work at MIT with Professor Josephine Carstensen. Before starting in research, he worked as a structural engineer in New York City at Eckersley O'Callaghan.

Monday, October 5, 2026 4:00 – 5:00 p.m.

1310 Yeh Student Center