



SEMINAR

APPLIED MATHEMATICS AND MECHANICS

FS920

15 June 2017

A DCAMM seminar No. 711 will be presented by

Professor Dennis M. Kochmann
Department of Mechanics and Materials
ETH, Zürich, Switzerland
and
Dept. of Aerospace at Caltech, USA

The title of the lecture is

**From strong trusses to guided waves:
computational challenges in truss metamaterials**

Abstract:

Recent advances in additive manufacturing have made truss networks a popular architectural tool to engineer new (meta)materials with controllable properties across various scales. By designing the small-scale architecture and geometry of periodic, random or hierarchical networks, the resulting metamaterial can be equipped with beneficial, tunable mechanical properties such as stiffness, strength, and energy absorption. With new opportunities arise new challenges since state-of-the-art scale-bridging truss networks require new theoretical and computational tools to predict the effective performance. We will discuss two such modeling areas of topical interest and discuss new approaches: First, we will investigate the stiffness and strength of hierarchical nanolattices, and we will highlight theoretical-computational tools to efficiently simulate large networks – both by coarse-graining the discrete network by quasicontinuum approaches, and by nonlocal homogenization resulting in an effective continuum description. Second, we present a method to efficiently predict wave propagation and energy absorption in truss lattices, which illustrates the shortcomings of most current techniques. Throughout, we aim to reduce the complexity of the problem by appropriate model assumptions, rather than using brute-force calculations.

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| DATE: | Thursday, 29 June 2017 |
| TIME: | 14:00 – 14:45 + questions |
| PLACE: | Room 002, Building 421, DTU, Technical University of Denmark |

Danish pastry, coffee and tea will be served 15 minutes before the seminar starts.

All interested persons are invited.

Niels Leergaard Pedersen

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