



# SEMINAR

APPLIED MATHEMATICS AND MECHANICS

FS995

11 April 2024

A DCAMM seminar No. 773 will be presented by

**Associate Professor Jun Wu**  
TU Delft, The Netherlands

The title of the lecture is:

**Space-time topology optimization for additive manufacturing**

**Abstract:**

Additive manufacturing (AM) holds the promise to manufacture with less waste and energy, and to deliver the optimal quality for products ranging from customized medical implants to lightweight airplane parts. Computational design by means of topology optimization is considered as the key to reach the optimal quality. However, the quality of AM-produced parts is not solely determined by their structural design but also heavily influenced by the fabrication process used to create them. Currently, structural design and fabrication sequence planning are treated as separate, sequential tasks. Consequently, the actual quality of AM-produced components often falls short of the expected outcome set by optimized designs. Moreover, optimized designs may not even permit a feasible fabrication sequence, and must be manually adapted. This leads to compromised quality, substantial cost increases, and prolonged product development cycles.

In this presentation, I will share our recent research on the concept of concurrent structural design and process planning, which we refer to as "space-time topology optimization". We introduce the time dimension to encode fabrication sequences, transforming structural design and fabrication sequence planning into a unified optimization problem in the space-time domain. I will illustrate the effectiveness of this framework by addressing critical issues in wire arc additive manufacturing, specifically focusing on minimizing thermal distortion in components during and after fabrication.

DATE:	<b>Wednesday, 1 May 2024</b>
TIME:	<b>11:00 – 11:45</b>
PLACE:	<b>Building 303A, Room 045</b> DTU, Technical University of Denmark

All interested persons are invited.

Jan Becker Høgsberg

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