



# SEMINAR

APPLIED MATHEMATICS AND MECHANICS

FS966

25 October 2021

A DCAMM seminar No. 750 will be presented by

**Senior Scientist Ricardo A. Lebensohn**  
**Los Alamos National Laboratory, Los Alamos**  
**New Mexico, USA**

The title of the lecture is

## **FFT-based Polycrystal Plasticity Modelling: New Implementations and Applications**

### **Abstract:**

Crystal plasticity (CP) models are increasingly used in engineering applications to obtain microstructure-sensitive mechanical response of polycrystalline materials. These models require a proper consideration of the single crystal deformation mechanisms, a representative description of the microstructure, and an appropriate scheme to connect the microstates with the macroscopic response. Full-field Fast Fourier Transform (FFT)-based methods, originally proposed by Moulinec and Suquet [1] for composites and extended by us to polycrystals [2] are attractive due to their relative higher efficiency compared with CP-Finite Elements, and their direct use of voxelized microstructural images. In this talk, we will report recent progress on FFT-based polycrystal plasticity, with emphasis in novel implementations, including large-strain elasto-visco-plasticity, strain-gradient plasticity, creep, and dynamic deformation/inertial effects. We will show applications of FFT-based methods to micromechanics of nano-metallic laminates (NMLs), creep lifetime predictions of steels, and integration with 3-D characterization methods.

[1] Moulinec, H., Suquet, P., 1998. A numerical method for computing the overall response of nonlinear composites with complex microstructure. *Computer Methods in Applied Mechanics and Engineering* 157, 69-94.

[2] Lebensohn, R.A., 2001. N-site modelling of a 3D viscoplastic polycrystal using Fast Fourier Transform. *Acta Materialia* 49, 2723-2737.

DATE:	<b>Tuesday, 9 November 2021</b>
TIME:	<b>10:00 – 10:45</b>
PLACE:	<b>Room 061B, Building 414</b> 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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