**Numerical and experimental methods for development of manufacturing processes for lightweight materials**

**Date:** 2021-10-07 kl. 12.00

Fredrik Forsberg, Experimental Mechanics, LTU:

**X-ray Microtomography for 3D/4D quantitative studies of lightweight materials and processes**

X-ray Microtomography enables 3D in-situ imaging and characterization of materials, including minerals, rocks, metals, composites, and wood, with sub-micron resolution. From the acquired 3D data it is possible to make a quantitative characterization of internal features such as porosity, cracks, grains, fibers etc., as well as determine material deformation and strain using dedicated software. The research at LTU is mainly carried out in our “X-ray Microtomography Lab”, using a 3D x-ray microscope (XRM) of model Zeiss Xradia 620 Versa, together with an additional in-situ module that allows both mechanical and thermal loading of the samples, while being scanned. Also, in October 2021 the system will be upgraded with a LabDCT module that allows 3D crystallographic imaging of polycrystalline samples.

This talk will give an overview of the technique and its possibilities, together with selected results from past and present studies - with a focus on lightweight materials and processes.

Anna-Lena Ljung, Fluid Mechanics, LTU:

**Modelling injection molding of thermoplastic polymers on different size scales**

Computational Fluid Dynamics, CFD, provide a valuable tool for the development of manufacturing processes for lightweight materials. Quality and trust in modelling is however essential as complex rheology, thermodynamics, solidification, fibre inclusion etc. put high demands on the computational accuracy and efficiency.

This talk will address the challenges and opportunities of using multiphase CFD for simulating thermoplastic material during injection moulding. Specific focus will be directed towards simulations where small-scale effects due to e.g. surface patterns are of importance.