KTH SOLID MECHANICS SEMINAR; Thursday, November 12th, 16.15; https://kth-se.zoom.us/j/66164228646

Ole Sigmund's KEYNOTE seminar "Multi-scale Topology Optimization"

Topology optimization was introduced as a multi-scale approach in the seminal paper by Bendsøe and Kikuchi from 1988. However, simpler isotropic density interpolation schemes soon substituted the original homogenization-based approach and have contributed to the breathtaking development of topology optimization methods – lately further spurred by the popularization and availability of advanced 3d printing techniques making it possible to realize complex, highly optimized topology optimized structures. Multi-scale or homogenization-based topology optimization approaches have recently been revived, partly to save computational costs in giga-resolution studies and party due to the possibility of building structures with architected infill through additive manufacturing techniques. The talk will give an overview of various techniques to perform multi-scale topology optimization and how to extract optimized designs through subsequent de-homogenization. This includes discussions of what microstructures are optimal for what loading conditions. For example, closed-walled microstructures are known to be stiffness optimal but may fail due to local buckling for low volume fractions.

Ole Sigmund is the world leading researcher within topology optimization. Ole Sigmund is a Professor and Villum Investigator at the Department of Mechanical Engineering, Technical University of Denmark (DTU). He obtained his Ph.D.-degree in 1994 and Habilitation in 2001 and has held research positions at University of Essen and Princeton University. He is a member of the Danish Academy of Technical Sciences and the Royal Academy of Science and Letters and is the former President (2011-15, now EC member) of ISSMO (International Society of Structural and Multidisciplinary Optimization) and former Chairman of DCAMM (Danish Center for Applied Mathematics and Mechanics, 2004-2010). Together with Noboru Kikuchi and Martin Bendsøe, Ole Sigmund is one of the founders and present main contributors to the development of topology optimization methods in academia and industry.