EML WEBINAR

OLE SIGMUND

TECHNICAL UNIVERSITY OF DENMARK

TOPOLOGY OPTIMIZATION – STATUS AND PERSPECTIVES

Since its introduction by Bendsøe and Kikuchi in (1988), topology optimization has developed from a purely academic discipline to the preferred tool for light-weighting structures in automotive, aerospace and other weight conscious industries. Topology optimization solves mechanical and multiphysics design problems allowing the ultimate design freedom, i.e. it determines whether any point (or element) in space should be filled with material or left empty in order to optimize a given objective function while satisfying physical and geometrical constraints. The talk will give an overview of the field, a.o. demonstrated by recent giga-scale applications in airplane wing and super-long suspension bridge design. Originally, the approach focused on simple compliance minimization problems but recent works to be discussed have paved the way for solving large scale stress constraint problems with hundreds of millions of constraints as well as large scale buckling problems. Other directions to discussed include design for geometry control and manufacturability, meta-material design and multiphysics problems. Finally, we discuss ways to reduce the CPU time for large scale problems by use of efficient multiscale approaches and knowledge of optimal microstructures.

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.

Host: **Professor Sulin Zhang**, Penn State University

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