

DY 22: Talk H. Hoffmann

Time: Tuesday 9:30–10:00

Location: BH-N 243

Invited Talk DY 22.1 Tue 9:30 BH-N 243
Complex Systems in Mechanical Engineering? A paradigm shift ahead. — •NORBERT HOFFMANN — Hamburg University of Technology, Germany

For a variety of reasons, mechanical engineering systems, like aircraft, space structures, vehicles, and the like, have always been said to be designed and operated at the limit of the feasible in terms of complexity. Traditionally complexity in this context has mostly been understood in terms of optimally exploiting physical processes and other variables of design spaces. The resulting machines typically consist of many thousands of interlinked and interacting components, which are often operating in highly sophisticated time-dependent manners. Still, the

majority of design paradigms in mechanical engineering are largely dominated by the concepts of static equilibrium or simple periodicity. Since the early days of the industrial revolution this approach seems to have been very successful. The price was an over-design of machines to cope with a wide envelope of complex loading and response states. It is only rather recently that the wish for further optimisation, e.g. towards truly light-weight structures, a stronger and stronger individualisation of machines, and a growing amount of machine intelligence questions the traditional approach. First findings from research, as well as from business innovations pose the question if innovative future mechanical engineering systems will also be designed and operated on the basis of truly complex dynamics.