Technische Universität Braunschweig

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MUSEN

Assessment of Extreme Infrastructure Loads via High-Fidelity Computational Mechanics

Lecture of

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Okerhochhaus, Pockelsstraße 3,
seminar room, ground floor

Current megatrends such as climate change (threats from e.g. wind, water, mud), urbanization (pedestrian loading, sanitation), globalization (pathogen transmission) and addiction to social media (polarization of society) will invariably lead to an increase in the loads on infrastructure - and in general the built environment -, which will have to withstand them. This not even counting the usual extreme loads due to plate tectonics (earthquakes, tsunamis) or accidental or intentional explosions.

In many of these cases the interaction of loads and structures is such that many non-dimensional numbers need to be reproduced in prototype or scaled-down experiments, making this approach difficult. Due to the development of numerical methods, continuous experimental verification campaigns and the rapid and ongoing advance of compute power, computational mechanics has emerged as a viable option to estimate these extreme loads the built environment will face in the coming decades.

The talk will expand on the themes touched above, and give a series of examples taken from wind, water, explosion, pedestrian and pathogen load cases that were used to assess the risk of actual or new designs. In some of these cases new (and astonishing) phenomena were discovered which had not previously been seen in experiments or noticed in the field.