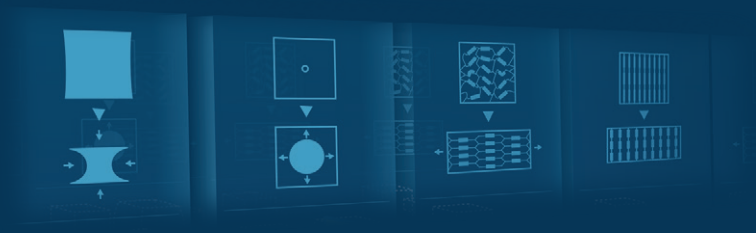

Fraunhofer CPM

FOSTERING THE PARADIGM SHIFT IN MATERIALS RESEARCH

International Conference on Programmable Materials

27 - 29 April 2020, Berlin

Symposium

Optimal design of mechanical metamaterials and bionic structures

What does the symposium want to achieve?

Topology optimization methods for the external shape of components have been established in industrial practice for many years. So-called free material optimization methods and multi-scale methods have been developed in recent years. With the rapid development of additive manufacturing technologies (3D printing) it is possible and also necessary to optimize the outer shape simultaneously with the local inner (micro)structure of the material in the design process. In many applications the variation and the switching of the mechanical properties by an external trigger (e.g. external load, temperature change) are desirable. In these cases, the optimal design depends on the load history, which therefore has to be included in the optimization. Such optimization problems occur, for example, in the following cases

- Programmable materials (e.g. programmable stiffness or shape)
- Fluid structure interaction (e.g. materials with negative permeability)
- Bionic functional structures (e.g. mechanical sensors)
- Microstructures produced by 3D printing of polymers or metals

Furthermore, robust optimizations and process optimizations are required for 3D printing processes.

What kind of contributions are desired?

Oral presentations and posters can be submitted with title and a half-page abstract. The abstracts will be evaluated in a scientific selection process.

Who is the symposium addressed to?

The purpose of the symposium is to promote the discussion between researchers working on the methods itself and researchers or practitioners applying such methods.

What is the focus?

Our symposium focuses on **numerical methods** (algorithms, theoretical background, applications, extensions in the fields of mechanics) for the simulation and optimization of metamaterials and programmable materials.

However, the symposium does not focus on pure lightweight structures and photonic metamaterials.

Symposium organizers

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