Mathematical methods for optimal design of structures

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Recent advances in 3D printing techniques have opened new opportunities for the production of structures not manufacturable with standard subtractive procedures. Fields of interest in such a direction involve, for instance, building and architectural engineering, automotive and space industry and prosthetic medicine.

The actual challenge is represented by the possibility of manufacturing structures optimized with respect to a target quantity of interest for the specific field of application. In this context, mathematical and numerical studies have allowed a significant contribution to the understanding and enhancement of additive manufacturing procedures. In particular, shape and topology optimization as well as homogenization techniques have experienced a growing interest in frontier academic and industrial research.

Goal of this session is to provide the state-of-the-art of recent mathematical methods and numerical algorithms for optimal design of structures, including (but not limited to) level-set, phase-field and density based approaches. This session is also expected to address practical issues such as manufacturing constraints and design under uncertainties, with possible contributions by industry and software companies.