

APPLICATIONS OF SHAPE OPTIMIZATION IN COMPLEX ENGINEERING PROBLEMS

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MINISYMPOSIUM

Computational design via shape optimization (SO) has been widely explored over the last few decades to solve problems in which boundary and interface phenomena are critical for accurately representing the physical response. SO plays a pivotal role in traditional engineering design applications, where it has been leveraged to improve the performance of structures. In addition, recent advances in additive manufacturing of architected materials have greatly increased design freedom and enabled multifunctional features over traditional structures. SO must now be applied to solve these more complex design problems that involve a combination of complex physics and intricate parameterizations. This will require SO strategies for precise shape control, and large-scale computing, among other considerations. Hence, this mini symposium aims to bring together researchers from diverse backgrounds to not only showcase innovative shape optimization techniques but also encourage collaborative discussion on challenges encountered in multidisciplinary fields where shape optimization has found successful applications. We invite contributions with a focus on but not limited to the following topics:

- Design of lattice metamaterials.
- Smart/active/responsive material design.
- Optimal design of energy systems.
- Multi-physics, multiscale, multifunctional design.
- Manufacturing constraints in shape optimization.
- High-performance computing in shape optimization.
- Reduced-order multiscale modeling in shape optimization.
- Simultaneous material and shape optimization.
- Implicit and explicit shape parameterization of engineering systems.
- Generative (and AI-aided) design of shapes.
- Optimization under uncertainty.

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