Mathematical Problems in Engineering

Hindawi

Special Issue on

Simultaneous Topology, Shape, and Sizing Optimization of Trusses and Frames

CALL FOR PAPERS

Truss/frame optimization is a field of research that has been studied for several decades. Based on design variables types, truss design problems can be categorized as topology, shapes, and sizing optimization. Normally, topology optimization is carried out at the early stage of design and then shape and sizing design are performed sequentially. However, it has been found that the concurrent design or simultaneous topology, shape, and sizing optimization lead to better design solutions, because all types of design variables are used within one optimization run. The design problem usually involves weight minimization subjected to stress, displacement, local buckling, and natural frequency constraints. Such structural constraints often result in a severely nonconvex feasible region, which is difficult to solve using a classical gradient-based optimizer. Therefore, the use of metaheuristics becomes an alternative choice.

Both gradient-based and metaheuristic optimizers have their advantages and disadvantages. Optimization methods using derivatives usually have acceptable convergence rate and tend to have the ability to search for the same optimum solution starting their search from different initial solutions. Metaheuristics on the other hand lack the aforementioned advantages but they are simple to use, derivative-free, robust, and capable of dealing with global optimization. More importantly, they can search for a Pareto optimal front within one optimization run.

The objective of this special issue is to present original research and review articles related to the use of optimizers with and without using gradients for solving concurrent design of trusses and frames.

Potential topics include but are not limited to the following:

- Truss/frame optimization
- Topology, shape, and sizing optimization of trusses/frames
- Concurrent design of trusses/frames subject to stress, displacement, buckling, and natural frequency constraints
- Many-objective and multiobjective design of trusses/frames
- Self-adaptive metaheuristics and hyperheuristics for truss/frame concurrent design
- Real-world applications
- Test problems for algorithm development

Authors can submit their manuscripts through the Manuscript Tracking System at http://mts.hindawi.com/submit/journals/mpe/sts/.

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