Title:
Concurrent truss topology and geometry optimization with stability constraints

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Abstract:

Truss topology and geometry optimization models have been studied for decades. In this talk, we introduce global stability constraints based on linear buckling analysis to the model. The mathematical formulation leads to a nonlinear semidefinite programming problem, for which we have implemented a solution technique based on interior point method. Although the joints are allowed to change locations, there is a need to impose some limits on their moves to avoid numerical instability. Consequently, the optimal designs depend on the initial configuration of the joints. To minimize this dependency, we apply an iterative procedure where the restrictions are progressively updated to allow the joints navigate much larger regions in the design domain and achieve huge reduction in the weight of the structures. We present several numerical experiments to demonstrate the proposed model, the implemented optimization method, and the iterative procedure.

References:

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