

Title

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Multiobjective Truss Topology Optimization by Linear/Sequential Linear Programming Method

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Abstract

The present paper deals with a multiobjective optimization of truss topology by either a sequential linear programming (SLP) method or a linear programming (LP) method. The ground structure approach is often used to solve this kind of design problems. In this paper, the topology optimization is formulated as a multiobjective optimization problem (MOP), which is to find the cross-sectional area of truss members, such that both the total volume of members and the weighted mean compliance are minimized. Based upon the Kuhn-Tucker conditions (the optimality condition), the Pareto optimal front of this problem can be obtained theoretically. The truss topology optimization under multiple load cases can be solved by the SLP. On the other hand, the LP such as the Simplex method can be applied to find one of the Pareto optimal solutions of the MOP under single load case. The applications of either the SLP or the LP are illustrated in numerical examples with discussion on characteristics of design results.

Key words

Topology Optimization, Linear Programming, Sequential Linear Programming, Multiobjective Optimization, Multi Load Cases, Single Load Case