

Integrated Layout Design of Supports and Structure Based on Stiffness

Spreading Method

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This paper presents a study on the integrated layout optimization of supports and structure using the stiffness spreading method. The locations of the supports and the topology of the structure are optimized simultaneously. The supports are treated as elastic components whose stiffness can be embedded into the structure with the stiffness spreading method. Thus remeshing approaches are avoided and the optimal sensitivity can be obtained analytically. The SIMP model is employed to treat the topology optimization of the structure and the MMA is used as the optimizer. Several mean compliance minimization problems are studied subject to material volume and cost constrain. It is found that varying cost of supports has a great effect on the layout of the supports and the structure. Numerical examples illustrate the feasibility and effectiveness of the proposed method.

Keywords: Stiffness spreading method, Integrated layout optimization, Locations of supports
Topology optimization