



群对称桁架振动设计的半正定模型与降维问题(英)

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Optimization of Truss Vibration with Reduction of Symmetric Semidefinite Programming

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摘要 桁架振动优化设计可描述为: 在给定振动系统最低频率的约束条件下, 设计用材最省的桁架结构. 本文针对具有某种结构对称性的桁架, 利用有限群描述这一特性, 在已有桁架设计的半正定规划模型基础上, 运用最近提出的矩阵代数方法对半正定规划问题的决策变量和数据进行降维, 给出了构造有限群表示的两个充分条件, 并实现了一类群对称桁架振动优化设计的半正定模型降维. 基于问题的实际背景, 我们又考虑了一个具有八根弹性棒的桁架设计实例, 进一步说明在实际问题中根据群对称构造群表示以及对应不可约表示的具体方法.

关键词:

Abstract: A truss vibration optimization problem is to minimize the total weight of truss subject to a given fundamental vibration frequency. This paper focuses on the recent results of matrix algebraic approach to solve the truss vibration optimization problem expressed in terms of symmetric semidefinite programming problem. We derive two sufficient conditions on constructing the symmetric group representation to reduce the problems size. An example of eight-bar truss design problem is given to illustrate how to construct a group representation and to demonstrate its effectiveness.

Keywords:

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