

Optimization of initial prestress for cable-strut systems with multiple symmetric self-stress modes

Pei Zhang*^{1,2}

* ¹College of Civil and Transportation Engineering, Hohai University, Nanjing, 210098, China; ²State Key Laboratory of Subtropical Building Science, South China University of Technology, Guangzhou 510005, China
1 Xikang Road, Nanjing, Jiangsu
zhangpei250131@163.com

Abstract

This study mainly focuses on initial prestress design of symmetric cable-strut systems with multiple symmetric self-stress modes. A novel optimization model for the determination of combination coefficients of independent symmetric self-stress modes is presented, where the global rigidity of the structure is employed as the objective function. A penalty function is used to consider both hard and soft constraints including stability conditions, unilateral property of members and prestress distribution evenness. Two strategies of the genetic algorithms with and without incorporating isolation niche technique are developed to solve this optimization problem respectively. A typical numerical example is tested to validate the efficiency of the present approaches.

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