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## 一种设计参数型的有限元模型修正方法

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### A METHOD OF FINITE ELEMENT MODEL UPDATING VIA DESIGN PARAMETERS

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摘要

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**摘要** 本文提出了一种设计参数型的有限元模型修正方法。依据正交条件,采用系统矩阵对设计参数的台劳展开式,建立参数修改量的线性方程式,用奇异值分解方法求解。在本方法中充分考虑了试验模态参数误差的影响,及试验振型自由度扩充等问题。计算机仿真及实际算例的结果表明,本方法计算量小、精确度较好。

**关键词:** 结构模型 有限元法 动态试验

**Abstract:** What is presented in this paper is a method of finite element model updating via design parameters using test modal data. Based on orthogonality relationships, the method adjusts the design parameters instead of the elements of mass and stiffness matrices. The Taylor's series of the system matrices expanded with respect to design parameters is adopted. The conducted set of linear equations is solved by a singular value decomposition technique. Because of the linear relation of system matrices with the most design parameters, the method is suitable to the cases of the severe change of the parameters, and the parameters converge to the "true value" by only several iterations. The problems, such as the effect of errors on the test modal parameters, the expansion of the degree of freedoms of test mode shapes, etc, are handled. The weighted global fit procedure is used to pre-process the test mode shapes- to smooth the shapes and expand the degree of freedoms of the shapes simultaneously. The method can not be only applied to the finite element model updating, but also to the structural dynamics redesign. Numerical and practical examples show the efficiency and accuracy of the method.

**Keywords:** structural model finite element method dynamic experiment

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