Reduced super beam based approach to finite element model updating of beam-type structures

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Abstract

A reduced super beam based finite element model updating technique for beam-type structures is proposed in this paper. The model reduction method is adopted to condense the entire beam-type structural model into a reduced super beam model with much less degree of freedom. And the eigensolutions and eigensensitivities are re-analyzed from the reduced eigenequation of the reduced super beam in the updating process, thus reducing the computational load of the traditional model updating methods which perform on the original structure. The modal dynamic property difference approach is adopted for updating the reduced super beam model and standard optimization techniques are used to find the optimal values of the structural parameters that minimize the difference. The effectiveness and efficiency of the proposed method are illustrated through a complicated stiffened cylindrical shell structure.

Keywords: Reduced super beam, model updating, beam-type structures, optimization.