Public Abstract

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Titled: *A Generalized Approach for Calculation of the Eigenvector Sensitivity for Various Eigenvector Normalizations*

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Sensitivity analysis is an important step in any gradient based optimization problem. Eigenvalue and Eigenvector Sensitivity Analysis has been a major area for more than three decades in structural optimization. An efficient and generalized method is required to do the sensitivity analysis as it can reduce computational time for large industrial problems. Previous methods focus mainly on calculating the eigenvector sensitivity for mass normalized eigenvectors only. A new generalized method is presented to calculate the first and second order eigenvector sensitivities for eigenvectors with any normalization condition. This new generalized method incorporates the use of normalization condition in the eigenvector sensitivity calculation in a manner similar to the calculation of eigenvectors themselves. This generalized method also reduces to Nelson's method, which is accepted as the most efficient and exact method for eigenvector sensitivity analysis for mass normalized eigenvectors. Equations to compute eigenvector sensitivities when the normalization condition is changed are also derived. The effect of the eigenvector normalization condition on the eigenvector sensitivity is discussed. Examples are provided to illustrate the generalized method for the calculation of 1st order and 2nd order eigenvector sensitivities and the use of rescaling equations.