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Pseudo Modal Operating Deflection Shape Based Estimation Technique of Mode Shape Using Time History Modal Assurance Criterion

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Abstract : Studies of System Identification(SI) based on Structural Health Monitoring(SHM) have actively conducted for structural safety. Recently SI techniques have been rapidly developed with output-only SI paradigm for estimating modal parameters. The features of these output-only SI methods consist of Frequency Domain Decomposition(FDD) and Stochastic Subspace Identification(SSI) are using the algorithms based on orthogonal decomposition such as singular value decomposition(SVD). But the SVD leads to high level of computational complexity to estimate modal parameters. This paper proposes the technique to estimate mode shape with lower computational cost. This technique shows pseudo modal Operating Deflections Shape(ODS) through bandpass filter and suggests time history Modal Assurance Criterion(MAC). Finally, mode shape could be estimated from pseudo modal ODS and time history MAC. Analytical simulations of vibration measurement were performed and the results with mode shape and computation time between representative SI method and proposed method were compared.

Keywords : modal assurance criterion, mode shape, operating deflection shape, system identification
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