World Academy of Science, Engineering and Technology
International Journal of Civil and Architectural Engineering
Vol:9, No:11, 2015

Second Order Statistics of Dynamic Response of Structures Using Gamma Distributed Damping Parameters

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Abstract : This article presents the main results of a numerical investigation on the uncertainty of dynamic response of structures with statistically correlated random damping Gamma distributed. A computational method based on a Linear Statistical Model (LSM) is implemented to predict second order statistics for the response of a typical industrial building structure. The significance of random damping with correlated parameters and its implications on the sensitivity of structural peak response in the neighborhood of a resonant frequency are discussed in light of considerable ranges of damping uncertainties and correlation coefficients. The results are compared to those generated using Monte Carlo simulation techniques. The numerical results obtained show the importance of damping uncertainty and statistical correlation of damping coefficients when obtaining accurate probabilistic estimates of dynamic response of structures. Furthermore, the effectiveness of the LSM model to efficiently predict uncertainty propagation for structural dynamic problems with correlated damping parameters is demonstrated.

Keywords : correlated random damping, linear statistical model, Monte Carlo simulation, uncertainty of dynamic response
Conference Title : ICACE 2015 : International Conference on Advances in Civil Engineering
Conference Location : Madrid, Spain
Conference Dates : November 12-13, 2015