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Uncertainties of Parameters Quantification in SHM

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The uncertainties of parameters quantification due to various known and unknown conditions are crucial to understand for structural health monitoring (SHM) systems. For instance, the amplitudes and the variation of loading conditions play a vital rule how the structural parameters are going to be changed. Hence, the aforementioned issue leads to an additional challenge in the area of SHM that requires attention. This study observed the behaviour of a steel bridge experimentally by employing multi-sensors scenarios e.g. accelerometers and triangulation laser sensor. The dynamical properties such as the peak (e.g. maximum-minimum) accelerations and displacements are evaluated. Additionally, the frequencies and damping ratio from the measured data of the tested bridge has been estimated by utilizing the fast Fourier transform (FFT) and power spectral density (PSD) estimation. The outcome shows that the variation of input excitations (i.e., random, free-decay, extra-loading) effects the investigated properties as well as on their magnitudes considerably. Therefore, the findings suggest that before making a final judgement based on the identified/estimated properties from measured data, the underlying uncertainties need to be considered to avoid sub-optimal assessment strategy.

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