

A novel procedure for dynamic identification from ambient vibration data

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Abstract: Dynamic identification based on ambient vibration data, also known as Operational Modal Analysis (OMA), is a class of procedure which pertain with the identification of the modal properties of systems based on vibration data collected when the systems are under their operating conditions. In this manner, no initial excitation or measured artificial excitation is required. These procedures for testing and/or monitoring systems, are particularly attractive for civil engineers concerned with the safety of complex structures. However, since the external force is not recorded, the identification methods need to be particularly sophisticated and based on stochastic mechanics. In this context, this contribution will introduce an innovative ambient identification method based on the application of the Hilbert Transform, to obtain the analytical representation of the system response in terms of the correlation function. In particular, it is worth stressing that the analytical signal is a complex representation of a time domain signal: the real part is the time domain signal itself, while the imaginary part is its Hilbert transform. In this regard, numerical examples, as well as real experimental data, will be used assessing the reliability and accuracy of the proposed approach over other conventional procedure.

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