



Improved Time-domain Modal Parameter Identification Algorithm in Noisy Environment by Using Sparsity Representation

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ABSTRACT

Time-domain algorithms are well established category of methods for structural modal parameter identification since its inception in 1970's. Time-domain methods use only response data and avoid using FFT in the extraction of modal information. One of the major challenges of this category of methods has been the determination of order of the system, or the discrimination of false modes from real ones, and several algorithms have been developed to address this issue. In this paper, a new algorithm is proposed by representing the structural responses with components which are sparse. We demonstrate this algorithm with ITD method. An over-complete dictionary is constructed by complex frequency and complex mode shape obtained by ITD method. The orthogonal matching pursuit algorithm (OMP) is employed to solve for the sparse representation, and the sparse components are identified as false modes. The effectiveness of the algorithm is verified by processing the experimental data and real monitoring data, and its performance is compared with traditional algorithms for false modes discrimination.

KEYWORDS: *modal parameter identification; Ibrahim Time Domain method; sparse representation; Orthogonal Matching Pursuit algorithm*