측정된 신호의 물리적 의미를 고려한 다중입력을 받는 다자유도계 구조물의 System Identification 기법 개발

System Identification for MIMO Systems Considering Physical Relationships between Measured Variables

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ABSTRACT

Improved rational polynomial approximation method is presented for the modeling of the multi input and multi output (MIMO) systems. Based on experimentally determined frequency response function data, rational polynomial transfer function models of structural systems are identified. Known physical relationships between the measured variables are incorporated in this MIMO frequency domain identification method. The method has three stages: (i) an initial estimation model is generated using a linear least squares method, (ii) the Steiglitz-McBride method is applied to improve the initial estimation model, (iii) a maximum likelihood estimator is optimized using the Levenberg-Marquardt method. For verification of the method, two experimental studies are conducted using shaking table tests; one is the system identification of an actively controlled two-story bench-scale building employing an active mass driver, and the other is for a smart base-isolated structure employing an MR damper. Using the developed method, system models of the experimental structures are estimated, and simulated time histories for the models are compared with measured responses. These comparisons demonstrate that the proposed method is quite effective and robust for system identification of MIMO systems. A graphic user interface program, named MFDID has been developed to realize the suggested method

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