

잡음이 크게 존재하는 판 구조물에서 충격 발생 위치 추정 An Impact Source Localization for a Plate in a Noisy Environment

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Abstract : A technique to localize an impact source on a plate is proposed. In the conventional localization methods, it is possible to estimate the impact location if the information on both the TOAD(Time Of Arrival Difference) between two sensors and the corresponding group velocity are known. However, the techniques are no longer valid in cases where a material property or the geometry of the propagation medium is not informed, and the propagation signal is very small or embedded in a noise. In this paper, we offer a localization method that is applicable to the cases the group velocity data are not noticed in advance and the response signals are contaminated with the noise. To reduce the noise effect, an asymmetric exponential window is applied in the smoothed Wigner-Ville distribution. The group velocity corresponding to a specific frequency is estimated based on the measured TOAD and the relative distance between a pair of accelerometers from a scanned location. The variance distribution of the estimated group velocities on the structure is calculated. Then the point having the minimum variance is to be coincided with the real impact position. To test the validity of this technique, the experiment and simulation have been performed. As a result, the proposed technique is found to be powerful for the impact source localization, even in a noisy environment without information on the real group velocity.