

Diagnosis Of Guided-Wave Damage Localization Using Complex Hierarchical Sparse Bayesian Learning

Shicheng XUE, Yong HUANG, Wensong ZHOU, Hui LI

Structural damage localization based on guided-wave has drawn significant attention because of the advantages of small attenuation, large transmission range and sensitivity to defects. However, there are many inherent factors that may affect the accuracy of damage localization. As a result, damage localization diagnosis is useful to tackle this problem. In this paper, a diagnosis technique is proposed to investigate whether the damage localization is accurate. A sparse inversion model is firstly established and a Complex Hierarchical Sparse Bayesian learning (CHSBL) algorithm is employed to localize the structure damage based on a small amount of measurement data. The posterior uncertainty quantified by CHSBL is utilized to give a diagnosis in damage localization results, based on the phenomenon that inaccurate damage localization corresponding to much larger posterior uncertainty. Finally, numerical and experimental studies were performed to validate the proposed method. The results demonstrate that by applying the method, the performance of Guided-wave damage localization can be monitored and, when necessary, improved by adding more sensors.