



Damage detection of steel-concrete composite girder bridges

Debao Chen

【Background】

The steel-concrete composite girder is widely used in highways due to its advantages of combining two construction materials. The percentage of bridges built more than 50 years ago in Japan will increase dramatically in this decade. The shortage of human resources and increase in maintenance costs are inevitable problems. The efficient SHM of steel-concrete composite girder bridges is essential for the evaluation of the structural performance and maintenance of this bridge type.

【Objective】

The research mainly focuses on structural performance evaluation of early-built steel-concrete composite girder bridges with deterioration. The research is aimed at finding a suitable signal processing method of strain data obtained from the bridge under live load and establishing an assessment framework of the neutral axis (NA) indicator to detect the damage of shear connectors and concrete bridge slabs.

【Approach】

Strain signals induced by vehicles contain ambient noise contamination and can be decomposed into stochastic vibration and static traffic response. Based on wavelet transform and Kalman filter, non-stationary signals are processed, and static responses are extracted. The NA position can be identified by analyzing the difference between the peak and the valley of sectional static strain signal.

【Publication plan】

Keywords: Neutral axis assessment framework

【Results】

The change of NA height identified from strain data based on the finite element model of a composite girder bridge is confirmed.

