

Vibration monitoring on a PC girder bridge during a bridge collapse test

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Abstract

Using the information gathered from vibration data has been proved successful when identifying damage on specific type of bridges in terms of structural health monitoring (SHM). However, It is still a challenging task to know the extent of the localized damage into the structural performance or even the degree of its vulnerability by means of the SHM. This study aims to examine how changes in load resistance capacity of an actual PC girder bridge influence on their dynamic properties. In this study a real PC girder bridge under static loadings, a bridge collapse-test, is discussed. In the static loading test, the PC girder bridge was put under several loading and unloading levels until failure. Besides, forced vibration tests from both impact hammer test and moving-vehicle test were carried out along the static loading test, in order to assess the changes in the dynamic properties of the PC girder bridge with different health conditions. An energy capacity which is a function of energy dissipation and potential energy of the PC bridge is adopted as a feature relevant to structural performance. Observations demonstrated that changes in the frequency of the second bending mode was more analogous with the changes of load resistance capacity than the first bending mode.

Keywords: bridge collapse-test; energy capacity; loading capacity; PC girder bridge; vibration monitoring