

Onsite Implementation of the Tap-scan Damage Detection Method on Bridge Structures

***Z.H. Xiang¹, Q.H. Lu¹, C.H Zhang¹, Z.P. Shen², and L.Y. Li²**

¹School of Aerospace, Tsinghua University, Beijing 100084, China

²China Road & Bridge Corporation, An Ding Men Wai Street C88, Zhonglu Plaza, Beijing 100011, China

*Corresponding author: xiangzhikai@tsinghua.edu.cn

An efficient inspection method that can quickly report the damage condition without traffic blocking is highly desired for the bridges located at busy transportation links. For this purpose, Xiang et al. proposed the Tap-scan damage detection method from the inspiration of the hunting behavior of woodpeckers [1]. With this method, damage information can be extracted from the acceleration of a passing vehicle with a tapping device. This talk reports the design of a bridge inspection vehicle based on the Tap-scan method. This vehicle has been implemented to the onsite inspection of several real bridges. Both structural discontinuities and local damage were clearly identified with a single scan at the speed of about 3km/h without stopping the traffic flow. This shows the potential of using this vehicle to filter out damaged bridges from large amount of candidates in a short time.

Keywords: Tap-scan method, Damage detection, Bridge, Inspection vehicle

Acknowledgements

This research was supported by the Ministry of Finance of China and the Natural Science Foundation of China (10802040). Thanks also go to engineers who gave valuable assistance on vehicle system building and onsite inspection experiments.

1. Z. H. Xiang, X. W. Dai, Y. Zhang and Q. H. Lu, The tap-scan method for damage detection of bridge structures, *Interaction and Multiscale Mechanics*, 3, 173-191 (2010).