

## Effect of high-cyclic loads on dynamic response of reinforced concrete slabs

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### ABSTRACT

Bridge reinforced concrete deck slabs are often subjected to various cyclic loadings—making regular checks for fatigue damage necessary. Several experiments on reinforced concrete structures were conducted to evaluate its mechanical fatigue behaviour. Nevertheless, adequate experimental investigations on its dynamic properties are still needed. This paper reports on the test performed on three identical reinforced concrete slabs, with different cyclic load number and after the cycles, the load was increased up to the static failure. Modal testing was performed after each step of loading to assess their dynamic performance using modal parameters (natural frequencies, mode shapes and damping ratios). Finite element model was used to predict the natural frequency of the reinforced concrete slabs and their reliability was checked through model updating. The results showed the intensity of fatigued structures causes significant changes to the modal parameters and structural loading capacity. The study explores how fatigued structure can be assessed from dynamic performance, and also can be quantified through its structural stiffness, ultimately offering a better way of using non-destructive modal testing in identifying its structural health as compared to conventional testing techniques.

### KEYWORDS

Fatigue; Modal parameters; Modal testing; Reinforced concrete slabs; Structural stiffness

**ACKNOWLEDGEMENT**

This research was supported by Fundamental Research Grant Scheme (FRGS-FP004/2014B), Ministry of Education, Malaysia and University Malaya High Impact Research (HIR-UM.C/HIR/MOHE/ENG/36 (D000036-16001). Authors would like to thank all technicians in Heavy Structural Laboratory and Concrete Laboratory, Department of Civil Engineering, University Malaya and Faculty of Civil Engineering, University Technology MARA, Malaysia.