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Vibration-Based Structural Health Monitoring: Theoretical Foundations and Experimental Validation on Reinforced Concrete Beams

Quick identification of damages in structures is of great importance to engineers. Among the various techniques available for the evaluation of reinforced concrete structural integrity, non-destructive tests method remain a viable one as its use can lead to speedy decisions that bring savings on repairs or replacement of damaged reinforced concrete structures. This research uses modal parameter-based non-destructive tests to assess damages in reinforced concrete beams under static load. Four-point static loadings were applied to the 3 RC beams to induce three damage scenarios. After each static loading, a dynamic test was performed to access the degree of stiffness degradation. Modal frequencies and mode shapes obtained depicts clearly the stiffness degradations of the beams as the severity of damages on the beams became more pronounced. Results obtained showed that the research procedure adopted is a smart approach for damage assessment in reinforced concrete elements.

Keywords: *Damage Assessment, Dynamic Test, Non-Destructive Tests, Reinforced Concrete Beams*