Design of Structural Health Monitoring System for a Damaged Reinforced Concrete Bridge

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Abstract: Monitoring and structural health assessment are the primary requirements for the performance evaluation of damaged bridges. This paper highlights the case study of a damaged Reinforced Concrete (RC) bridge structure where the Finite element (FE) modelling of this structure was done using the material properties extracted by the in-situ testing. Analysis was carried out to evaluate the bridge damage. On the basis of FE analysis results, this study proposes a proper Structural Health Monitoring (SHM) system that will extend the life cycle of the bridge with minimal repair costs and reduced risk of failure. This system is based on the installation of three different types of sensors: Liquid Levelling sensors (LLS) for measurement of vertical displacement, Distributed Fiber Optic Sensors (DFOS) for crack monitoring, and Weigh in Motion (WIM) devices for monitoring of moving loads on the bridge.

Keywords : bridges, reinforced concrete, finite element method, structural health monitoring, sensors

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