

Condition monitoring and rating of bridge components in a rail or road network by using SHM systems within SRP

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Abstract. The safety and performance of bridges could be monitored and evaluated by Structural Health Monitoring (SHM) systems. These systems try to identify and locate the damages in a structure and estimate their severities. Current SHM systems are applied to a single bridge, and they have not been used to monitor the structural condition of a network of bridges. This paper propose a new method which will be used in Synthetic Rating Procedures (SRP) developed by the authors of this paper and utilizes SHM systems for monitoring and evaluating the condition of a network of bridges. Synthetic rating procedures are used to assess the condition of a network of bridges and identify their ratings. As an additional part of the SRP, the method proposed in this paper can continuously monitor the behaviour of a network of bridges and therefore it can assist to prevent the sudden collapses of bridges or the disruptions to their serviceability. The method could be an important part of a bridge management system (BMS) for managers and engineers who work on condition assessment of a network of bridges.

Keywords: synthetic rating procedures, structural health monitoring systems, strain gauges, deflection sensors, bridge management systems, criticality and vulnerability assessment

1. Introduction

Development of a reliable method for continuously monitoring the condition of a network of bridges is one of the essential needs of a bridge management system (BMS). BMSs are developed to maintain the safety and serviceability of a network of bridges. An important part of a BMS is to prioritise bridges based on their structural condition. The structural condition of a bridge is determined based on the condition of its important components. The condition of a component is deteriorated over time due to ageing and loading. Due to the scarcity of resources which are allocated to repair and maintain the components, they should only be invested on bridge components which their structural conditions are worse than others in a network of bridges. Hence, continually identifying those components with worst condition and rating them accordingly is an essential part of a BMS. Aflatooni (2015) attempted to critically review the literature related to bridge management and rating systems where further information could be found.

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