

Development of an automated monitoring system for steel bridges

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Abstract

The sudden collapse of several bridges in different parts of the world including developed countries such as USA and Japan has highlighted the need for an efficient monitoring system for such vital structures. Vibration based structural health monitoring (SHM) techniques has emerged in the civil engineering community as a promising tool to continuously monitor the integrity of structures to detect damage at early stages and consequently avoid global and sudden collapse of the monitored structure. As a result, several countries around the world utilized this system and instrumented critical infrastructures with hundreds of sensors. These monitoring systems typically produce huge amounts of data every year which make data management, transfer and analysis a very challenging task to accomplish. Therefore, development of an automated SHM that can not only perform the damage detection task but also manage both the hardware and the produced data is extremely important. In this project, a MATLAB based automated SHM is developed at The University of Auckland, New Zealand and has been tested on lab models. The developed system can perform the following tasks periodically and automatically:

- Structure excitation
- Data recording
- Reliability check of the data
- Application of damage identification techniques
- Generation of damage report
- Sending alarm signal in case of detecting damage.

The developed system can be a promising tool to enhance the damage detection process and the performance of vibration based SHM systems.

Keywords: Structural health monitoring, Damage detection, Non-destructive evaluation, Vibration based damage identification