

Developing a Hybrid BIM-based Structural Health Monitoring System for Safety Enhancement

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Abstract

Structural health monitoring systems can provide us the requisite information about the level of the structural damage caused by an earthquake, immediately after its occurrence. Nowadays, one of the most prominent subjects discussed in the fields of structural maintenance and safety is to find algorithms to process the invaluable information obtained from sensors and also to present simple but practical criteria in order to assess the ongoing structural health state. This study aims to acquire a reasonable and appropriate evaluation of the structural health after the earthquake and investigate building serviceability by estimating the level and location of the damage. This can significantly contribute to the decision of immediate building evacuation well as in time rehabilitation of damaged members. The developed system is applied on a 5-story building which was modeled in Revit software and by defining a health monitoring system, the level and location of damage caused by a specific earthquake are determined. Finally, employing such a hybrid system (BIM¹-SHM²) enables visualizing the damaged part and facilitating the process of safety-related decisions.

Key words: structural health monitoring, building information modeling, safety, integration

1. Introduction

Structures such as buildings, bridges, railroads, oil platforms, etc. are considered as the most important and strategic infrastructures. The aforementioned structures typically have high total cost; therefore, any damage or interruption in their performance would impose irreversible consequences [1].

Thus, it is necessary to define a structural monitoring and controlling system in order to aptly determine the possibility of the damage occurrence, damage level and damage

Building Information Modeling ¹

Structural Health Monitoring ²