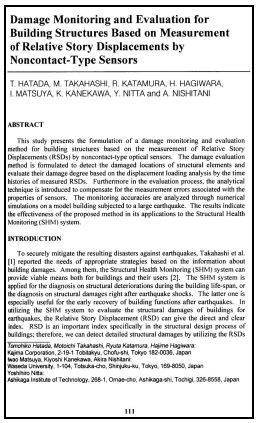

Damage Monitoring and Evaluation for Building Structures Based on Measurement of Relative Story Displacements by Noncontact-Type Sensors

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ABSTRACT

This study presents the formulation of a damage monitoring and evaluation method for building structures based on the measurement of Relative Story Displacements (RSDs) by noncontact-type optical sensors. The damage evaluation method is formulated to detect the damaged locations of structural elements and evaluate their damage degree based on the displacement loading analysis by the time histories of measured RSDs. Furthermore in the evaluation process, the analytical technique is introduced to compensate for the measurement errors associated with the properties of sensors. The monitoring accuracies are analyzed through numerical simulations on a model building subjected to a large earthquake. The results indicate the effectiveness of the proposed method in its applications to the Structural Health Monitoring (SHM) system.

INTRODUCTION

To securely mitigate the resulting disasters against earthquakes, Takahashi et al. [1] reported the needs of appropriate strategies based on the information about building damages. Among them, the Structural Health Monitoring (SHM) system can provide viable means both for buildings and their users [2]. The SHM system is applied for the diagnosis on structural deteriorations during the building life-span, or the diagnosis on structural damages right after earthquake shocks. The latter one is especially useful for the early recovery of building functions after earthquakes. In utilizing the SHM system to evaluate the structural damages of buildings for earthquakes, the Relative Story Displacement (RSD) can give the direct and clear index. RSD is an important index specifically in the structural design process of buildings; therefore, we can detect detailed structural damages by utilizing the RSDs

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Ключевые слова:

Содержание.