

7<sup>th</sup> European Conference on Structural Dynamics

**EURODYN 2008**

7-9 July 2008

Southampton

## **ESTIMATING DAMAGE POTENTIAL OF STRUCTURES IN ACTIVE SEISMIC ZONES**

**Mohamed I.S. Elmasry<sup>1</sup>**

<sup>1</sup>Construction and Building Engineering Dept.  
Arab Academy for Science and Technology and Maritime Transport (AASTMT)  
P.O. Box 1029, Abu-Qir, Alexandria, Egypt  
E-mail: elmasryi@aast.edu

**Keywords:** Structures Reliability, Damage Potential, Model Updating, Seismic Zones.

### **ABSTRACT**

Having sufficient information about structural models representing actual structures is essential to understand the expected behaviour of these structures under expected or unexpected loading. A finite element model is usually used in the design of the different members of a structure. However, structural models used in design are viable to changes during the lifetime of structures. This is sometimes due to construction requirements but mostly a result of having these structures subjected to special loading events such as seismic excitations. Detecting such changes at an early stage and feeding back the existing structural models is a must to protect structures against sudden damage or failures. Consequently, many system identification techniques that identify variations in the modal or model parameters of structural models were introduced in the last few decades by researchers around the globe. These methods can generally be used in the ongoing structural model updating procedure. However, though a lot of techniques can identify structural parameters variations successfully, yet the impacts of such variations on the damage potential of the studied structures are undefined. This piece of missing information may become really critical if the structure lies in a geographic area where earthquakes occur frequently or, in other words, with a small return period. This paper introduces a technique that evaluates the damage potential of structures in active seismic zones and shows how variations in the model parameters can affect such value. The method uses the model parameters and incorporates the earthquake intensity and the return period of the expected earthquake in evaluating the damage potential of structures. A moment resisting multistory steel frame structure is used as the case study. The resulting damage potential estimates can be a good guide for studying reliability of structures and urgency for retrofitting.