UNIVERSITI TEKNOLOGI MARA

DAMAGE INDEX ANALYSIS OF DIFFERENT CATEGORIES OF REINFORCED CONCRETE BUILDING FRAMES IN MALAYSIA UNDER EARTHQUAKE EXCITATIONS

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Most people perceived that Malaysia was free from life-threatening seismic crisis. In reality, seismic hazard in Malaysia is irrefutable, with seismic hazard originated from seismically active neighbouring countries such as Indonesia and Philippines. There were several methods that existed today used to predict buildings' damage index by using traditional non-destructive evaluation method, for examples, visual inspection and instrument evaluation method. However, these types of methods are complex for large structures since it was difficult to assess some parts of them. The evaluation of damage index in Malaysia is limited especially when the building exposed to the earthquake loading. Due to the increased number of earthquake incidents in Malaysia, the development of damage detection method therefore become much more challenging. This research presents the prediction of damage index of building using IDARC 2D program which used Park and Ang damage model. Therefore, the corresponding state of damage of the RC buildings can be identified in order to assess the building's condition under seismic loading. The time history analysis method was applied using Aceh earthquake recorded at Ipoh, Malaysia which occurred in December 26, 2004 at Indian Ocean with magnitude 9.3 on Richter scale and the analyses were carried out using ten intensities of seismic load; 0.05g, 0.10g, 0.15g, 0.20g, 0.3g, 0.4g, 0.5g, 0.6g, 0.8g and 1.0g respectively. The performance of the structure is shown by the damage index recorded from IDARC 2D analysis and the corresponding state of damage through previous study. The results show increased contribution to damage index value with increased height of structures, increased maximum displacement of structures and increased peak ground acceleration (PGA) value. The research resulted in new method of prediction model of damage index of RC frame that can be determined and according to the height, maximum displacement and PGA value to achieve acceptable behaviour when possible earthquake event happened.

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