

**SEISMIC VULNERABILITY ASSESSMENT OF RC STRUCTURES
USING INCREMENTAL DYNAMIC ANALYSIS**



by

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(NUST201260989MSCEE15212F)

A thesis submitted in partial fulfillment of
the requirements for the degree of

Master of Science

in

Structural Engineering

NUST Institute of Civil Engineering (NICE)

School of Civil and Environmental Engineering (SCEE)

This is to certify that the
thesis titled

**SEISMIC VULNERABILITY OF RC STRUCTRE USING INCREMENTAL
DYNAMIC ANALYSIS**

submitted by

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has been accepted towards the partial fulfillment

of the requirements for the degree

of

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**DEDICATION TAKES A LIFETIME;
BUT DREAMS ONLY LAST FOR A NIGHT.**

ACKNOWLEDGEMENTS

I am thankful to Almighty Allah, who gave me strength and patience to complete my research. I would like to thank my advisor Dr. Hassan Farooq, for his faith and guidance during this research. I am also extremely grateful to the committee members, for their sincere guidance to complete my research work.

I pay my earnest gratitude to Mr and Mrs Iqbal Ahmad, Mr and Mrs Ali and Mr Shahzad Ahmad for the continuous support and encouragement.

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Abstract

In most of the developing countries, where major portion of the existing building stock belongs to the era when seismic codes were not implemented, a thorough seismic vulnerability assessment is necessary. As the representative building which is considered in this study is typical building belongs to Pakistan. Poor detailing, low strength materials and low standard construction leads brittle failures in such structures. As with the evolution of performance based earthquake engineering it is necessary to estimate the fragility of such buildings to assess and analyze according to the new limit states.

The main purpose of this study is to evaluate the effect of selection and scaling of the earthquake records on the IDA curves results. The subject building which is gravity design building, its time period is determined and based site specific spectrum from UBC for region 2B. Two methods are chosen one is selection on the basis of single period and other is on the basis of range of period for the same building. The ground motion records are based on the local region fall in the category of moderate earthquake region. If the high seismic region was chosen, the bias in the dynamic structural instability would occur.

Incremental dynamic analysis is performed using a powerful tool OpenSEES. This software is validated using the experimental results obtained by a full scale frame which is tested on shake table with increasing intensity. Then fractiles from those IDA curves are found and performance limits are marked.

For the Near Field ground motion which are selected for the period of range, IDA curve don't scattered and give reliable results for the performance limits. When far field motions for the same method are used, the IDAs tend to be not reliable. As the selection of earthquakes are more likely from the same site but different station. When selection of earthquakes is done based on single period a large diversity is observed. Then fragility curves are drawn based on performance based limits.

