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ASSESSMENT OF SEISMIC PERFORMANCE OF RC STRUCTURE RETROFITTED BY ECCENTRICALLY BRACED SYSTEMS

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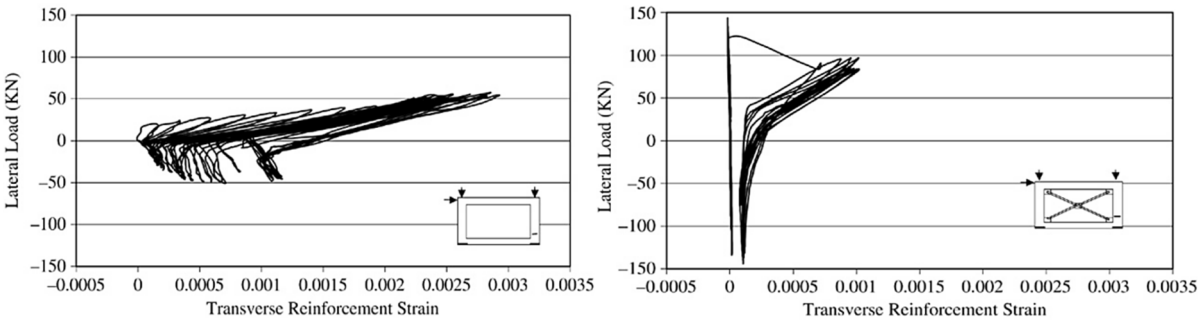
ABSTRACT

The vulnerability and poor seismic performance of the members of old non-seismically designed reinforced concrete frame structures has been proven time and again, both at laboratory level as well as by natural disasters in real life situations. However, on the other hand, a vast majority of existing structures designed with non-seismic considerations is not practically viable. Such structures need to be correctly assessed to predict their seismic performance and retrofitted, if required. In order to realistically predict the seismic performance of such structures, practical and accurate models for simulating the member inelastic behavior at structural level, are of utmost importance. Assessment of existing structures using such tools can predict the seismic performance of the structures with high degree of confidence. Based on such assessment, a cost-effective and efficient retrofit solution can be designed and developed.

This work has been focused on providing the solution of using steel braces in an eccentric way to retrofit member in reinforced concrete structures through analytical and numerical modeling approaches.



Flexural frame Braced frame

Figure 1. Seismic performance of RC frames with concentric internal steel bracing (Youssef et al., 2007).

In order to perform a comprehensive nonlinear analysis, the shear effect in members, especially the link beam in case of retrofitting, should be considered. For this, in current study, a shear model has been developed based on moment – curvature analysis which takes the advantage of being simple and practical. All the models and procedures in this thesis have been vastly validated against experiments conducted by other researchers in the literature. Good agreement with the experimental results at sub-assembly as well as structural proves the reliability of the proposed models. In the end, to

assess seismic performance reinforced concrete structures before and after retrofitting with steel braces, reinforced concrete frames has been designed. The lateral load – displacement relation, initial lateral stiffness, seismic performance and damage pattern corresponding to performance point and ultimate displacement has been examined for different situation of designing and retrofitting.

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