Influence of the yield strength of the LRB base isolation on the response of the isolated buildings in the Near-Fault

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ABSTRACT

Seismic base isolation are devices that used to limit the human and material damage caused by an earthquake. This devices diffuse the energy induced at the time of the earthquake before being transferred to the structure.The base isolated structures when subjected to the near-fault eathquakes which contain long-period velocity pulses that may coincide with the period of base isolated structures resulting in excessive deformation and rupture of isolators. Therefore, a parametric study on the yield strength of the lead rubber bearing isolation system carried out in this work has allowed the evaluation of the influnce of the yield strength of this seismic base isolation system on the dynamic response of the isolated structures in term of displacment, acceleration and absorbed energy. The results showed that the increase in the bearing yield strength causes the bearing displacment decreased signficantly without special effects on the superstructure accelerations.

Key Words: Lead rubber bearing, Yield strength, bearing displacement, Dynamic response

1 INTRODUCTION

Strong ground motion due to an earthquake excitation often calamitous disturbance that severely affects structures and their contents. The importance of the near-fault (NF) earthquakes characteristic has been noted by several researchers, Naeim, Bertero and chopra are researcher worked about NF. Large amplitude, long period and pulse in velocity records are the manually characteristics of NF earthquakes [1], [2].

Seismic isolation decouples a structure, part of it or equipment placed in the structure from the damaging effects of ground accelerations. This devices shift the fundamental frequency of the structure away from the domain frequencies of seismic excitations and the fundamental frequency of the fixed structure [3], [4]. In addition, it's also provides an energy dissipation mechanism at the level of isolation, reducing the relatively large relative displacements between the superstructure and the supporting ground. Finally, the seismic isolation system provides either rigidity under minor lateral loads such as wind loads.

The isolation system can use the following four methods of analysis, by increasing level of complexity: 1) Linear static analysis 2) Responses spectrum analysis 3) Linear time history analysis 4) Nonlinear time history analysis.

SAP2000 was used to model the whole structure. The model is able to qualify to the UBC97.The structure is modelled and analyze as a three dimensional structure. It has six degree of freedom. They are two horizontal movement, vertical movement, rotation about x-axis, rotation about y-axis and rotation about z-axis. Therefore, the diaphragms can appropriately distribute the seismic forces to lateral resisting elements according to its stiffness. Three dimensional linear structure and nonlinear isolators is used in this study. Response history connot be used for non-