



A Comparative Study of the Performances of FPS and LRB Isolators installed in Building

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Abstract

The study investigates the seismic behavior of a ten-story base-isolated building frame with a Friction pendulum system (FPS) and Lead rubber bearing (LRB) as base isolators. A non-linear time history analysis is carried out to obtain various demand parameters like base shear, maximum inter-storey drift, peak top storey displacement, top absolute acceleration, residual displacement of the isolator, number of plastic hinges (NP), plastic rotation for three selected earthquakes. The earthquake time histories typically represent the far field (FF), near field earthquakes (NF) with two effects (forward directivity and fling step). The time histories are scaled at different PGA levels such as 0.2g, 0.4g, 0.6g, 0.8g. To investigate the response behaviour of building frame at low, moderate, and high PGA levels. For comparing the engineering demand parameters between the FPS and LRB isolated building frames the properties of the isolator are so selected that their backbone curves are comparable to a great extent. The non-linear time history analysis (NTHA) is carried out by commercial software SAP 2000. The result of the study shows that the performance of the base-isolated (BI) building frame in resisting seismic forces is greatly alleviated as compared to the fixed base (FB) frame at the considered PGA levels. Further, the overall performance of the BI building frame with the FPS system is better as compared to the performance of the BI building frame with LRB.

Keywords: Base isolation system, Sliding isolator, Elastomeric isolator, Non-linear time history analysis