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Comparative Analysis of Base Isolation and Fixed Base Irregular Structures

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Abstract

It is very crucial to protect important structures such as hospitals, historical buildings, heritage monuments, etc., against the ground motion to safeguard people and structures. There are many ways to increase the structural stiffness, but only a handful of techniques are available such as dampers and base isolators which can increase the damping of the structure. A mid-rise building is considered in this paper to compare the effectiveness of base isolation. A comparative study of the effectiveness of base isolation using Rubber Bearing with a fixed base structure is carried out by considering a hospital building that is situated in seismic zone V. Further, the analysis is carried out by both linear and non-linear time history analysis. Parameters such as base shear, time period, storey displacement and storey drift are compared to understand the effectiveness of Rubber Bearing isolators. The main objective of this paper is to understand the principle behind base isolation and to study the effect of increasing damping in the structure. Moreover, an attempt is made to study the percentage reduction of displacement of the structure with Rubber Bearing isolators to a fixed base. This paper concludes that parameters such as base shear, storey drift and acceleration of the structure were a lot lesser in base isolation model compared to the fixed base model. The application of base isolation in structures enhances seismic protection thus offering better safety and durability.

Keywords: Non-linear time history analysis, Base isolator, Rubber bearing, Seismic analysis