

STUDY ON SEISMIC ANALYSIS OF BUILDINGS USING COMBINATION OF DIFFERENT ISOLATION SYSTEMS ABSTRACT

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ABSTRACT

The basic idea of base isolation system is to reduce the earthquake induced inertia forces by increasing the fundamental period of the structure. The aim of this study is the use of Lead rubber bearing (LRB) and friction pendulum system (FPS) as an isolation device and then to compare various parameters between fixed base condition and base isolated condition. With an aim of better including/understanding the effect of the emplacement of these devices on the response of the structures, the comparative studies were carried out in this article. The analysis is carried out by four comparative studies: the 1st and the 2nd between a fixed base structure and LRB and FPS base isolated systems and the 3rd and 4th between a fixed base structure combination of isolation systems. The isolated structure by FPS system decreases displacements, accelerations and shear forces compared to the structure isolated by LRB. The isolated structure with Comb-1 system decreases the displacements and shear force compared to the isolated structure with LRB system and isolated structure with Comb-2 combined system. From this study, we conclude that the use of FPS as a unique isolator is a good idea when the total cost is considered as an important thing. However, combining the FPS with a rubber-based isolator provides a good seismic isolation to the structure. In addition, the number and the location of the FPS at the base of a structure when is combined with a rubber-based isolator affect the response of the structure.

INTRODUCTION

The basic idea of base isolation system is to reduce the earthquake induced inertia forces by increasing the fundamental period of the structure (Trevor and Kelly, 2001). Seismic isolation enables the reduction in earthquake forces by lengthening the period of vibration of the structure. The typical period of isolated buildings is generally kept as 2.0 second (Athamnia B, Ounis AH, 2011). Therefore the significant benefits obtained from isolation are in structures for which the fundamental period of vibration without base isolation is short, less than 1.0 second. Buildings with comparatively higher natural period attract low earthquake