

EFFECT OF TIME INTERVAL BETWEEN PEAK HORIZONTAL AND VERTICAL RESPONSE OF SEISMIC COMPONENTS ON THE BEHAVIOR OF RC BUILDINGS

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ABSTRACT

Reinforced concrete buildings are generally subjected to three-dimensional earthquake ground motion. Recent studies, supported with increasing numbers of near-fault records, indicate that the ratio of peak vertical-to-horizontal ground acceleration can exceed the usual. With the considerable increase in near-fault strong ground motion records, and field evidence from earthquakes in two last decades, the considering importance of vertical ground motion has increased. Hence, in this study, a total of 7 records were selected to cover a range of frequency content, duration and amplitude. The specified arrival time was achieved by shifting the horizontal record along the time axis and original recorded V/H ratios were maintained throughout the arrival time study. The effect of arrival time interval on the period of vibration, ductility demand, and internal forces in structural members was studied by comparing against results from the case of the coincident vertical and horizontal peaks. The results show that the horizontal period is more elongated when the time interval is small. It can observe from results that mean ductility demand of the late arriving pulse motions is higher compared to the mean demand of the early arriving pulse motions. The results show that the contribution of vertical ground motion to the axial force variation tends to be reduced as time interval increases. Shear capacity of critical columns tends to decrease due to vertical ground motion. Changes in arrival time interval have no clear correlation with moments of critical columns and lateral displacement. The arrival time interval has a rather important effect on the shear capacity.

INTRODUCTION

Earthquake as destroying phenomenon in most parts of the world threatens buildings safety and lives of dwellers. By occurring near fault ground motion such as Northridge (USA), Kobe (Japan), Chi-Chi (Taiwan) that made a lot ruins lead to identifying the vertical components of earthquake and theory of researchers who believed in the past that a horizontal component of acceleration is always more than the vertical component of acceleration; therefore, it denies the most losses inserted on structures while earthquake is related to horizontal component of earthquake. Two known earthquakes of Parkfield (1966) and Pacoima Sanfernando (1971) are the big ones in California province and resource of research in identifying the nature of movement and heavy shakes near the center of earthquake. After these two earthquakes, the expression of fault was stated by Somerville et al. (1997).

Near fault ground motions such as Northridge USA, Kobe Japan, Chi-Chi Taiwan, occurring recently, have had many damages. We can refer to pulse-like movement with long- period at the beginning of record, fault rapture, acceleration and earth velocity being high, exerting hit to earth about earthquake near fault. The vertical component of acceleration is one of near filed earthquake characteristics. By increasing the distance from the center of earthquake, the vertical acceleration reduces high more than horizontal acceleration. Therefore, near