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Effect of Duration and Frequency on Ground Motion: Case Study of Guwahati City

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Abstract : The Guwahati city is one of the fastest growing cities of the north-eastern region of India, situated on the South Bank of the Brahmaputra River falls in the highest seismic zone level V. The city has witnessed many high magnitude earthquakes in the past decades. The Assam earthquake occurred on August 15, 1950, of moment magnitude 8.7 epicentered near Rima, Tibet was one of the major earthquakes which caused a serious structural damage and widespread soil liquefaction in and around the region. Hence the study of ground motion characteristics of Guwahati city is very essential. In this present work 1D equivalent linear ground response analysis (GRA) has been adopted using Deep soil software. The analysis has been done for two typical sites namely, Panbazar and Azara comprising total four boreholes location in Guwahati city of India. GRA of the sites is carried out by using an input motion recorded at Nongpoh station (recorded PGA 0.048g) and Nongstoin station (recorded PGA 0.047g) of 1997 Indo-Burma earthquake. In comparison to motion recorded at Nongpoh, different amplifications of bedrock peak ground acceleration (PGA) are obtained for all the boreholes by the motion recorded at Nongstoin station; although, the Fourier amplitude ratios (FAR) and fundamental frequencies remain almost same. The difference in recorded duration and frequency content of the two motions mainly influence the amplification of motions thus getting different surface PGA and amplification factor keeping a constant bedrock PGA. From the results of response spectra, it is found that at the period of less than 0.2 sec the ground motion recorded at Nongpoh station will give a high spectral acceleration (SA) on the structures than at Nongstoin station. Again for a period greater than 0.2 sec the ground motion recorded at Nongstoin station will give a high SA on the structures than at Nongpoh station.

Keywords : fourier amplitude ratio, ground response analysis, peak ground acceleration, spectral acceleration
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