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Assessment of Double Resonance from Microtremor Observations for Jammu Region in India

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Abstract

The Jammu region (JR) in the union territory of India is located in the northwestern Himalayas, affected by moderate to large magnitude earthquakes. To assess the possibility of double resonance effects (DRE) during significant earthquake events, this study examines the influence of Reinforced Concrete (RC) building vibrations in the JR in the context of local seismic response investigations. Using microtremor, a single station seismic ambient noise investigation was conducted at 242 locations to assess the predominant frequency (f_p) and H/V spectra for subsurface soil. During the field survey, building data is collected, and an empirical relationship between building height and vibration period is developed. The findings show that the fundamental frequency (f_f) of 17.35% of structures overlaps with the predominant frequency (f_p) of the site locations in the study area where microtremor testing was done. The vulnerability map divides the city into three discrete zones with high, medium, and low resonance levels, allowing for better hazard mitigation and town planning.

Keywords: H/V spectra, Double resonance, Predominant frequency, Jammu, Himalayas