

# Time-frequency and engineering characteristics on offshore ground motion

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Based on the offshore ground motions collected from California, U.S and Sagami trough zone, Japan, the time-frequency distribution feature of offshore ground motions was analyzed by Hilbert-Huang transform method. The corresponding spectral accelerations and dynamic amplification factor spectrum were compared with the design spectra in relevant seismic design standards. The research results indicate that, the offshore ground motions contain a wealth of long period component, the long period and ultra-long period component were dominant in frequency range. The energy distribution of the normalized marginal spectrum was correlated with epicenter distance. The horizontal offshore ground motion's energy was much larger than that of the vertical ground motion. Moreover, the further finds show that the dynamic amplification factor  $\beta$ -values of most offshore ground motions are greater than the current platform value of seismic design standards used, i.e., their long-period components are comment larger than that the seismic design standards given, so it is risky to carry out offshore facilities seismic design by land seismic design standards. In view of that there are lots of actual engineering structure, such as long-span bridges, oil and gas platform, etc., the long period components of offshore ground motions should be paid more attention in offshore engineering structure seismic design.

Keywords: Offshore ground motion, Seismic design, Hilbert-Huang transform method