

Ground Motion Estimation from the Initial P Wave of the Great Earthquake

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We proposed a quick method to estimate the site ground motion using the initial P wave from a single station. First, the ground motion estimation technique from the first 3-second P wave spectral intensity ($SI_{(3s)}$) was presented; meanwhile the peak amplitude of displacement (P_d) and the integral of the squared velocity (IV2) were selected as comparisons. With the aftershocks of the 2008 Ms 8.0 Wenchuan earthquake, we investigated the regression relationships between these 3 parameters and ground motion parameters (the peak ground acceleration, peak ground velocity and spectral intensity), based on which the ground motion estimation formulas were derived accordingly. The results showed that the proposed $SI_{(3s)}$ was of the highest accuracy with regard to the PGA estimation. Aiming at large magnitude earthquakes i.e. the Wenchuan main-shock, we put forward to introduce an amplification coefficient to revise the characteristic parameters in advance to predict the ground motions, thus the underestimation of great earthquakes could be mitigated to a certain extent.

Keywords: ground motion estimation, Wenchuan earthquake, P wave, spectral intensity, single station