Strong Ground Motion Prediction By Composite Source Model

J. Burjanek, K. Irikura and J. Zahradnik

A composite source model, incorporating different sized subevents, provides a possible description of complex rupture processes during earthquakes. The number of subevents with characteristic dimension greater than R is proportional to R^{-2}. The subevents do not overlap with each other, and the sum of their areas equals to the area of the target event (e.g. mainshock). The subevents are distributed randomly over the fault. Each subevent is modeled either as a finite or point source, differences between these choices are shown. The final slip and duration of each subevent is related to its characteristic dimension, using constant stress-drop scaling. Absolute value of subevents' stress drop is free parameter. The synthetic Green's functions are calculated by the discrete-wavenumber method in a 1D horizontally layered crustal model. An estimation of subevents' stress drop is based on fitting empirical attenuation relations for PGA and PGV, as they represent robust information on strong ground motion caused by earthquakes, including both path and source effect. We use the 2000 M6.6 Western Tottori, Japan, earthquake as validation event, providing comparison between predicted and observed waveforms.