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Recent updates in developing a statistical pseudo-dynamic source-modeling framework to capture the variability of earthquake rupture scenarios

Seok Goo Song (1), Sangmin Kwak (2), Kyungbook Lee (2), and Donghee Park (3)
(1) KIGAM, Daejeon, Korea (sgsong@kigam.re.kr), (2) KIGAM, Daejeon, Korea, (3) KHNP, Daejeon, Korea

It is a critical element to predict the intensity and variability of strong ground motions in seismic hazard assessment. The characteristics and variability of earthquake rupture process may be a dominant factor in determining the intensity and variability of near-source strong ground motions. Song et al. (2014) demonstrated that the variability of earthquake rupture scenarios could be effectively quantified in the framework of 1-point and 2-point statistics of earthquake source parameters, constrained by rupture dynamics and past events. The developed pseudo-dynamic source modeling schemes were also validated against the recorded ground motion data of past events and empirical ground motion prediction equations (GMPEs) at the broadband platform (BBP) developed by the Southern California Earthquake Center (SCEC). Recently we improved the computational efficiency of the developed pseudo-dynamic source-modeling scheme by adopting the nonparametric co-regionalization algorithm, introduced and applied in geostatistics initially. We also investigated the effect of earthquake rupture process on near-source ground motion characteristics in the framework of 1-point and 2-point statistics, particularly focusing on the forward directivity region. Finally we will discuss whether the pseudo-dynamic source modeling can reproduce the variability (standard deviation) of empirical GMPEs and the efficiency of 1-point and 2-point statistics to address the variability of ground motions.