Dynamic Source Parameters in Characterized Source Model

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Somerville et al. (1999) characterized source slip model of mainly California earthquakes from strong motion waveform inversion. They defined asperity which is an area whose final slip is larger than 1.5 times of average slip value. They found total asperity size is followed by a scaling relation. Recent events such as the 2000 Tottori-ken Seibu earthquake, the 1999 Chichi, Taiwan, and Kocaeli, Turkey, and other moderate-size crustal earthquakes are found to follow the relation (Miyakoshi et al.,2000; Iwata and Sekiguchi, 2000; Miyake et al., 2001). Irikura and Miyake(2001) showed characterized source model based on this source characterization for predicting strong motion as a RECIPE of strong motion prediction. The characterized source model is proofed through the strong motion simulation in near-source area for the 1995 Kobe (e.g. Kamae and Irikura, 1997) and the 1997 Kagoshima-ken Hokuseibu (Miyake et al., 1999) earthquakes.

Recently, using spatio-time slip distribution, i.e. kinematic source parameters, by waveform inversion, spatio-time shear-stress distribution i.e. dynamic source parameters can be mapped on the fault plane (e.g. Bouchon, 1997). Here, we compiled those source parameters on the fault plane and study on relations between the parameters for understanding the asperity in the characterized source model. In the case of the 2000 Tottori-ken Seibu earthquake (Zhang et al.,2001), we have some correlations between (dynamic and static) stress drops, final slip, and maximum slip velocity. Therefore, the asperity characterized by the final slip corresponds somewhat to high slip velocity or high stress drop area. However, more complex stress drop distribution is found than slip distribution, that might be related to heterogeneous rupture propagation. We need to discuss the relation between the obtained asperity and the short-period seismic wave generation area by acceleration envelope inversion (e.g. Kakehi and Irikura, 1994; Nahakara et al., 2000).