DYNAMIC RUPTURE SIMULATIONS OF A VERTICAL STRIKE-SLIP FAULT OF M6.5 CLASS CONSIDERING SPATIALLY-HETEROGENEOUS STRESS-DROP DISTRIBUTIONS

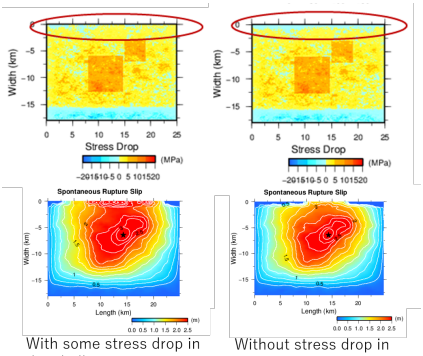
Hiroshi KAWASE [1], ***Jikai SUN*** [2], ***Arben PITARKA*** [3], ***Fumiaki NAGASHIMA*** [1], ***Eri ITO*** [1]

[1] Disaster Prevention Research Institute, Kyoto University, Uji, Japan
[2] Graduate School of Engineering, Kyoto University, Kyoto, Japan
[3] Atmospheric, Earth and Energy Division, Lawrence Livermore National Laboratory, Livermore, US

We investigated here the effects of source parameters that describe the complex nature of the source rupture process, with special focus on the spatial heterogeneity of the stress drop on the fault. We considered here both random fluctuation (Pitarke et al. 2009) and two rectangular asperities where the average stress drop is twice (6.4 MPa) as large as the global one (3.2MPa). The area of asperities is followed by the scaling low (Irikura & Miyake 2002).

We also consider the depth dependence of the stress drop distribution outside of the major seismogenic zone. Geometric parameters such as the rupture initiation point, relative separation distance between two asperities, and the depths of the two asperities are chosen to investigate. The assumed fault is a vertical strike-slip fault with the size (L x W)=(25 km x 18 km). The dynamic rupture simulation was performed by the FDM code using a slit-node formulation (Dalguer & Day 2007).

First we confirmed if the averaged slip and the peak ground velocity correspond to the value for the empirical relationship or not. Then we investigated the effects of Dc, asperity depths, and the stress drop distribution along the depth on the final slip distribution and the resultant peak ground velocity distribution. If we put asperities in the deeper part of the fault, we could not see much of the surface rupture, while if we put two shallow asperities the resultant surface break (displacement) becomes larger. If we decrease the stress drop near the surface, such a large surface break would be no longer emerged on the surface. The figure on the left shows the normal case, while the one on the right shows the small stress drop case. We can see apparent dependence of the shallow stress drop setting on the slip near the surface.



With some stress drop in the shallow part

Without stress drop in the shallow part