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## Trade-offs among dynamic parameters inferred from results of dynamic source inversion

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Dynamic rupture simulations have been performed in order to generate a physically consistent slip distribution. In these simulations, an attempt has been made to investigate the governing parameters, called dynamic parameters, of historical earthquakes. However, it has been reported that the parameters are not estimated accurately when only the ground motion records are employed, this is because of the trade-offs existing between the parameters, e.g., between the strength excess and the slip-weakening distance. In this study, we apply a dynamic source inversion to 2D synthetic tests in order to discuss parameter trade-offs. Sensitivity tests, which consist of numerous sets of inversions including a fixed stage and a released stage, are conducted such that a particular set of estimation parameters is not estimated in the fixed stage, and then, all of the parameters are estimated in the released stage. The results imply trade-offs between the rupture time and other parameters. From detailed comparisons between slip rates and waveforms, it is observed that the shapes of the slip rate profiles between the rupture time and the peak time do not contribute well to the generated waveforms. From a simple 1D assumption, a gradient of the slip-weakening friction law, namely, a weakening gradient, is analytically related to the peak-to-rupture time with a -1 slope in the log-log plot. The values estimated from the synthetic tests almost mirror the values of the -1 slope. The results imply the trade-offs between the weakening gradient and the peak-to-rupture time.

Keywords: Dynamic source model, inversion, trade-off