

# Effect of crack coalescence on dynamic source-parameter estimation

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We numerically investigate the effect of crack coalescence on the estimation of dynamic source parameters, stress drop and strength excess, in the analysis of waveform inversion. For this purpose, we simulate the spontaneous growth of two planar mode II cracks that dynamically coalesce into one and synthesize its waveforms using the elastodynamic boundary integral equation method (BIEM). We assume that dynamic parameters are uniformly distributed so that complexity appearing in the waveforms can be attributed only to the dynamic coalescence. We first make a kinematic model in which source parameter is slip-rate history: high slip-rate region is correctly inverted around the coalescence point. We then reconstruct a dynamic model from the kinematic parameters by assuming that only one crack propagates; this is because we usually do not know exact rupturing process under the ground. Our analysis shows that heterogeneity appears in the distribution of stress drop and/or strength excess around coalescence point, that is, crack coalescence under the uniform dynamic parameters is apparently equivalent to the heterogeneous distribution of those.