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Influence of model parameters on synthesized high-frequency strong-motion waveforms

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Waveform modeling is an important and helpful instrument of modern seismology that may provide valuable information. However, synthesizing seismograms requires to define many parameters, which differently affect the final result. Such parameters may be: the design of the grid, the structure model, the source time functions, the source mechanism, the rupture velocity. Variations in parameters may produce significantly different seismograms. We synthesize seismograms from a hypothetical earthquake and numerically estimate the influence of some of the used parameters. Firstly, we present the results for high-frequency near-fault waveforms obtained from defined model by changing tested parameters. Secondly, we present the results of a quantitative comparison of contributions from certain parameters on synthetic waveforms by using misfit criteria.
For the synthesis of waveforms we used 2D/3D elastic finite-difference wave propagation code E3D [1] based on the elastodynamic formulation of the wave equation on a staggered grid. This code gave us the opportunity to perform all needed manipulations using a computer cluster.
To assess the obtained results, we use misfit criteria [2] where seismograms are compared in time-frequency and phase by applying a continuous wavelet transform to the seismic signal.

[1] - Larsen, S. and C.A. Schultz (1995). ELAS3D: 2D/3D elastic finite-difference wave propagation code, Technical Report No. UCRL-MA-121792, 19 pp.
[2] - Kristekova, M., Kristek, J., Moczo, P., Day, S.M., 2006. Misfit criteria for quantitative comparison of seismograms. Bul. of Seis. Soc. of Am. 96(5), 1836–1850.