Digital appendix [Results for the ASCE7 standard design spectrum]

Spectral Matching RotD100 Target Spectra: Effect on records characteristics and seismic response

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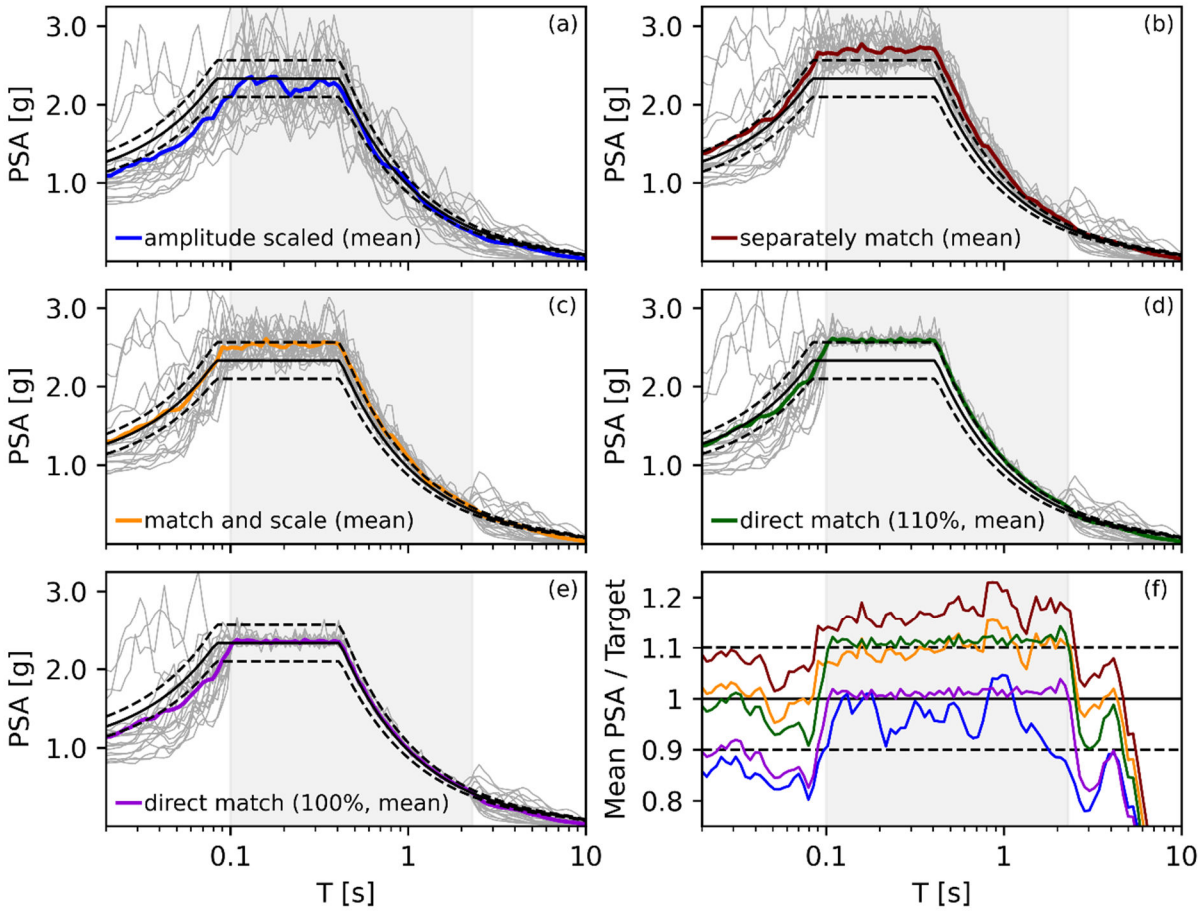

Figure 1. RotD100 response spectra for the amplitude scaled (a), separately matched (b), match and scale (c), direct math at 110% the target (d) and direct match at 100% the target sets. Figure 1(f) depicts the ratios between the sets mean response spectrum and the target spectrum.

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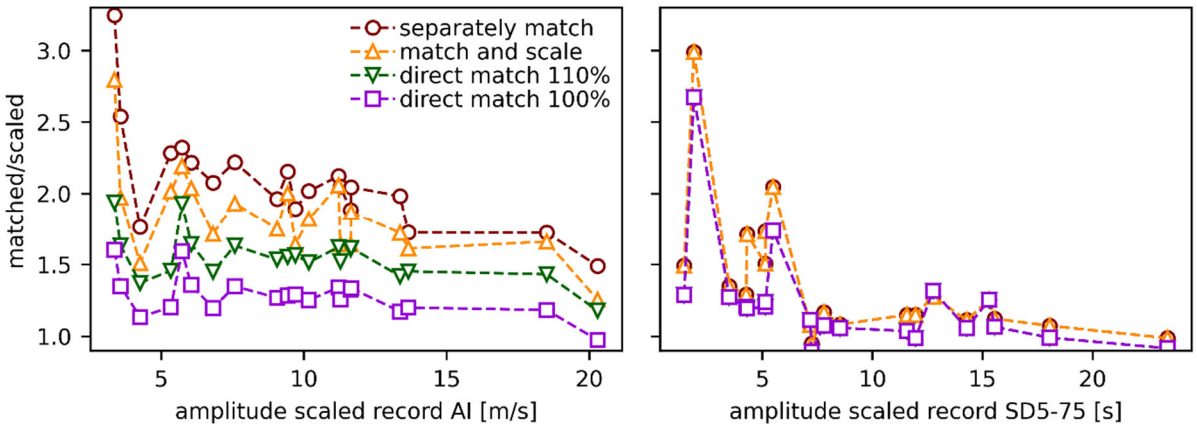

Figure 2. Left: ratios of Arias intensity (matched/scaled) for each record in the spectrally matched sets as function of the corresponding amplitude-scales record AI. Right: same as left but for the significant duration SD5-75. (Dashed lines are shown for clarity, but do not imply a sequence or order to the individual data points)

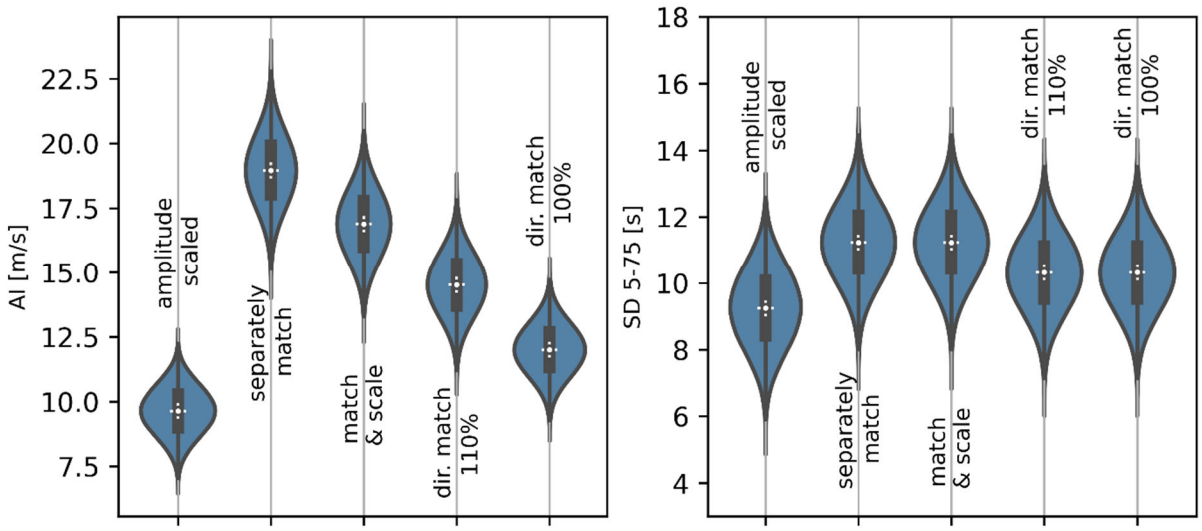

Figure 3. Arias intensity (AI, left) and significant duration (SD5-75, right) average values for the 167960 suites of 11 records that can be constructed from the combination of the 20 records in each set.

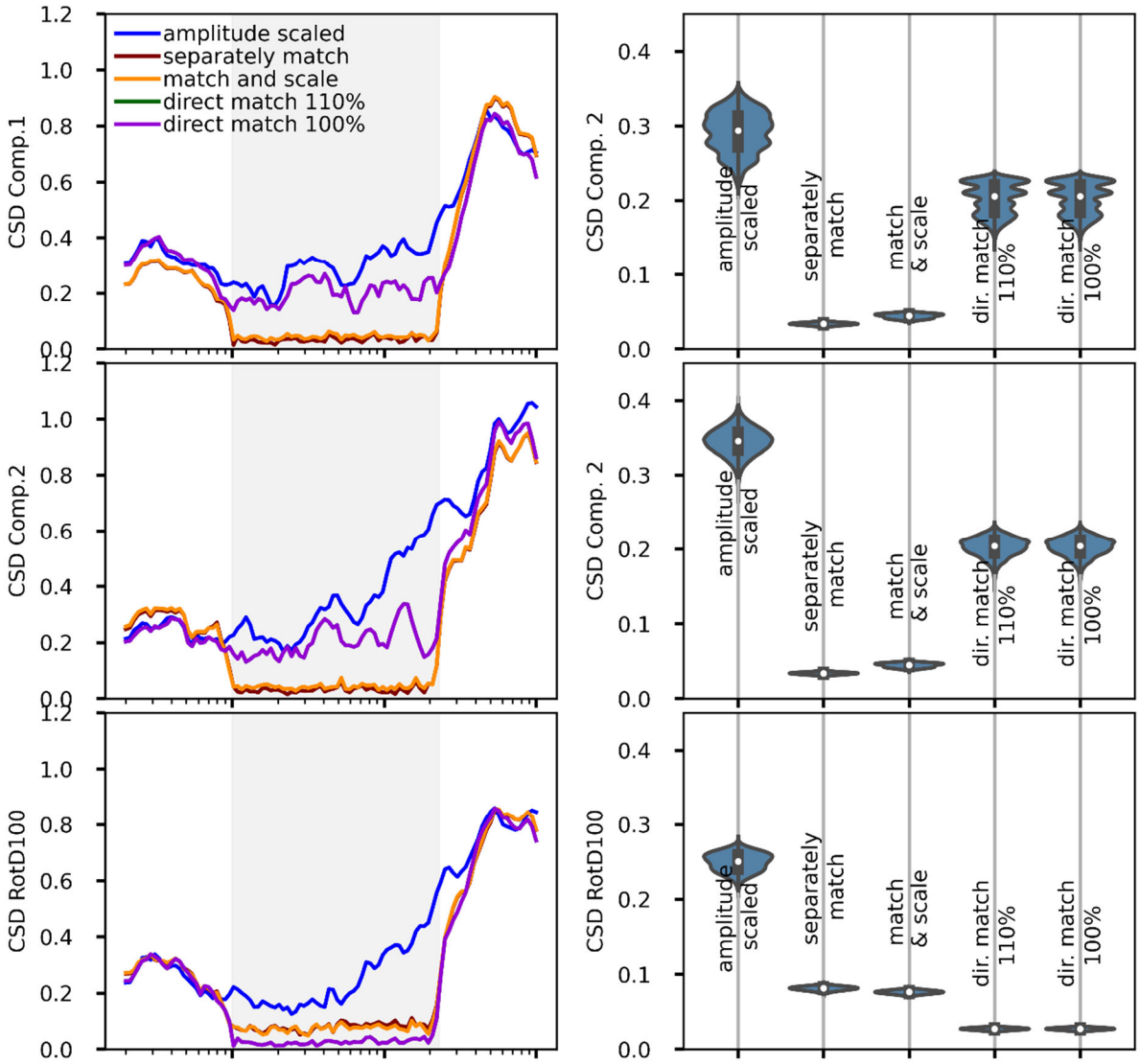

Figure 4. Left: conditional spectral dispersion (CSD) at different periods for the response spectra of the horizontal components (top and middle) and the RotD100 spectra (bottom). Right: Violin plots showing the CSD average values within the matching period range for the 167960 suites of 11 records that can be constructed from the combination of the 20 records in each set, top figures correspond to the CSD for each horizontal component response spectra and bottom plot to the RotD100 response spectra.

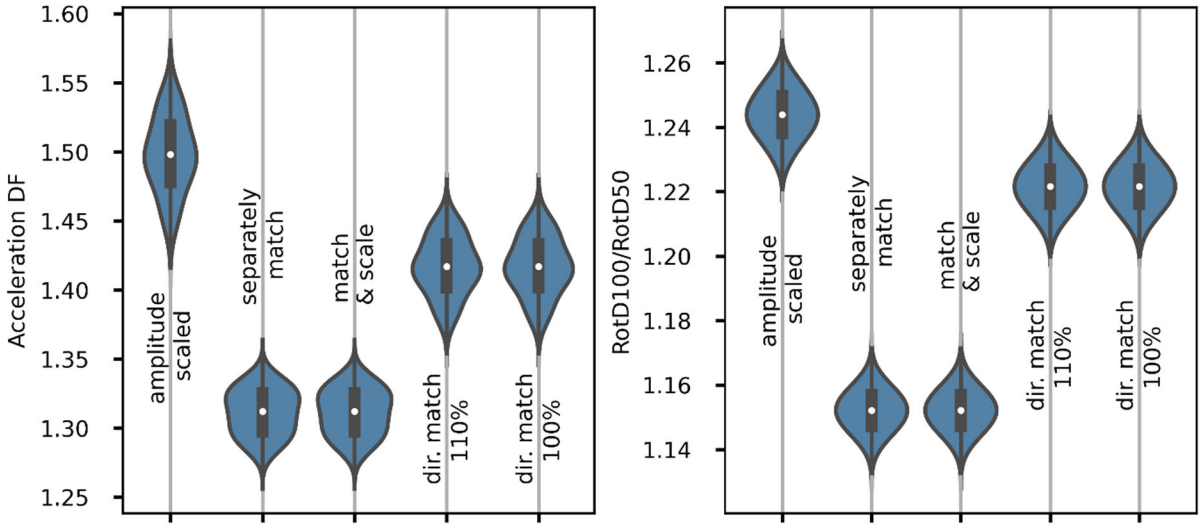

Figure 5. Acceleration directionality factor and Rtod100/RotD50 ratios (average over the matching period range) for the 167960 suites of 11 records that can be constructed from the combination of the 20 records in each set.

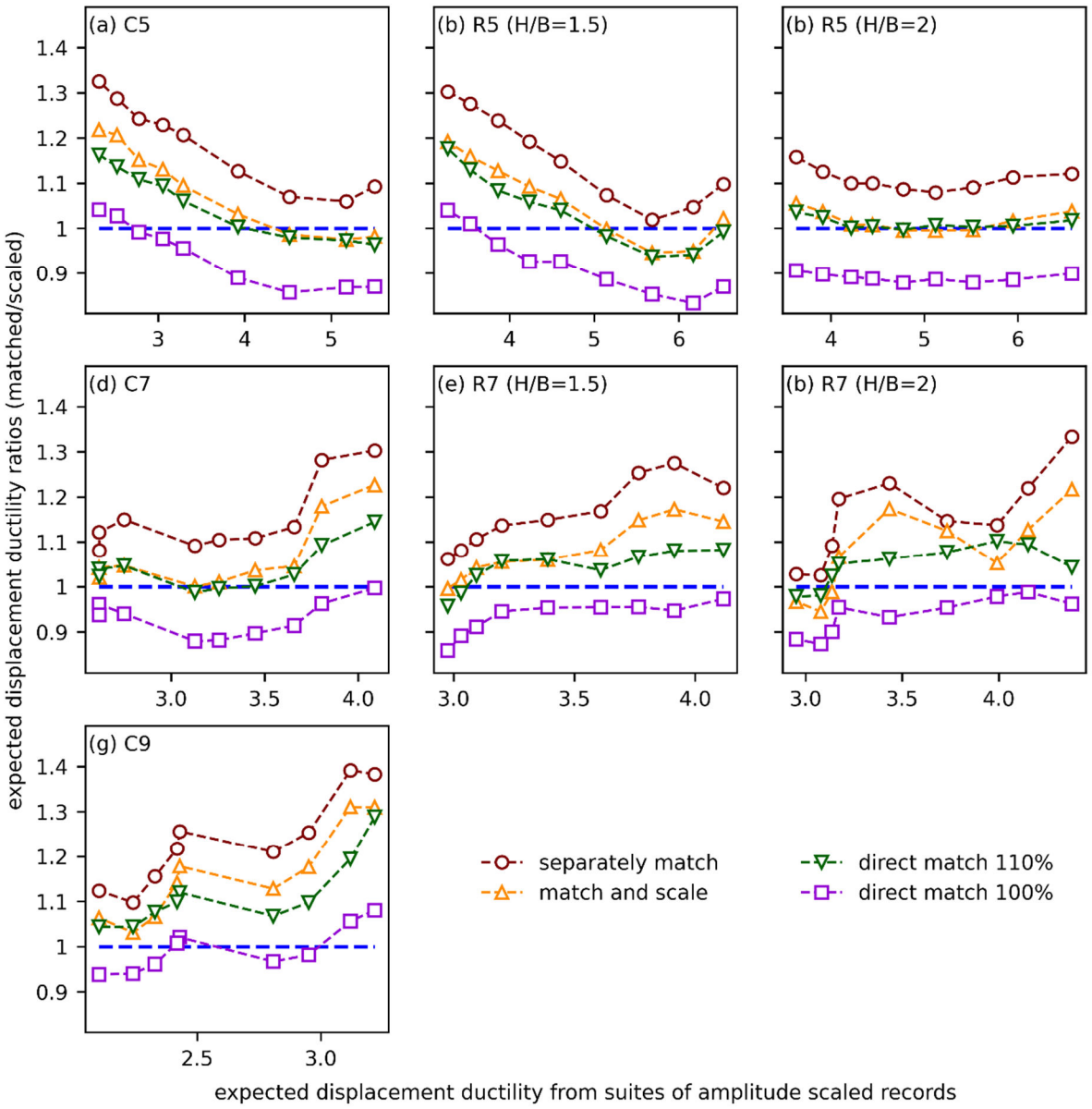

Figure 6. Expected displacement ductility ratios (spectrally matched suites / amplitude-scaled suites) as function of the expected displacement ductility from the suites of amplitude-scaled records.

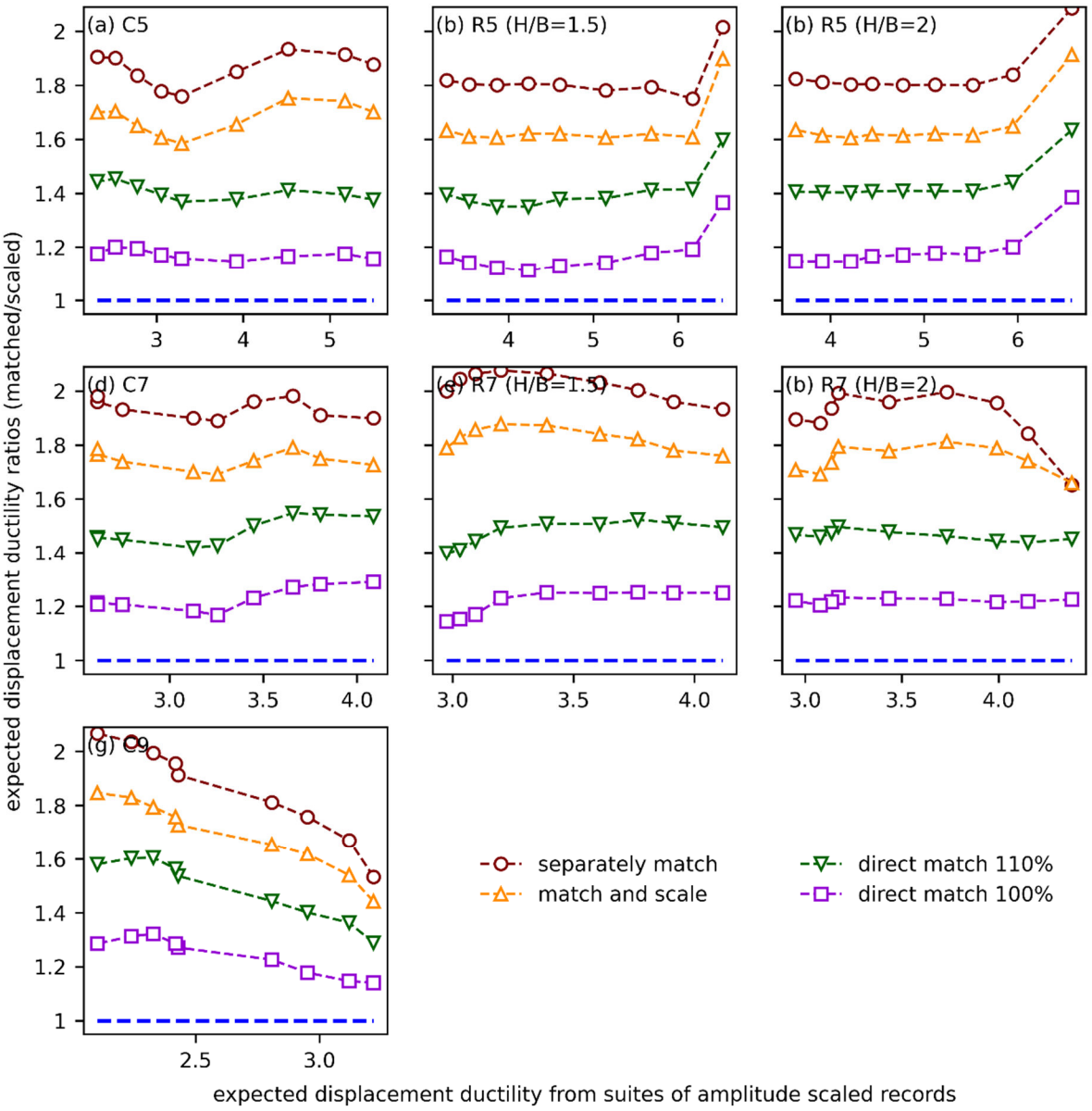

Figure 7. Expected rebar strain energy ratios (spectrally matched suites / amplitude-scaled suites) as function of the expected displacement ductility from the suites of amplitude-scaled records.