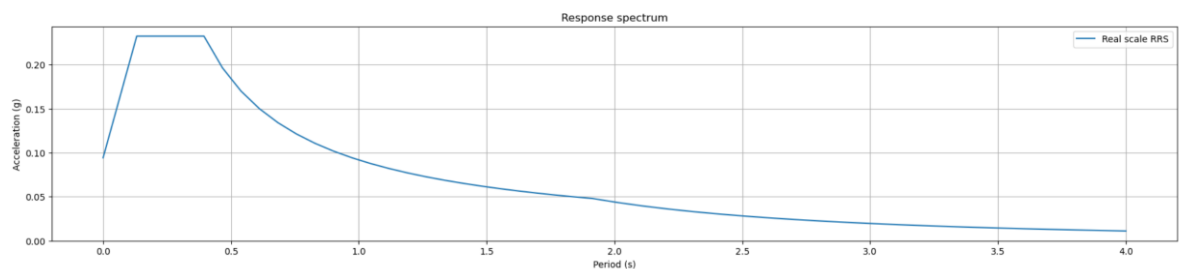


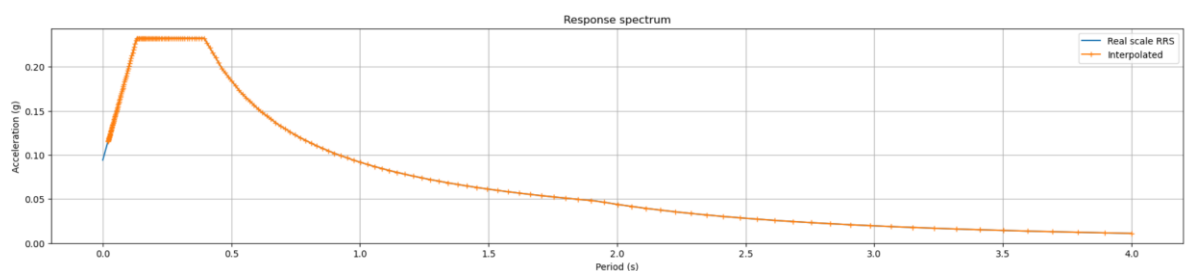
ERIES-VERDI – Signal generation procedure for the shake table test

The signals for the shake table test of the masonry tower with a 1:7 reduced scale and Cauchy similitude law were generated using the following procedure:

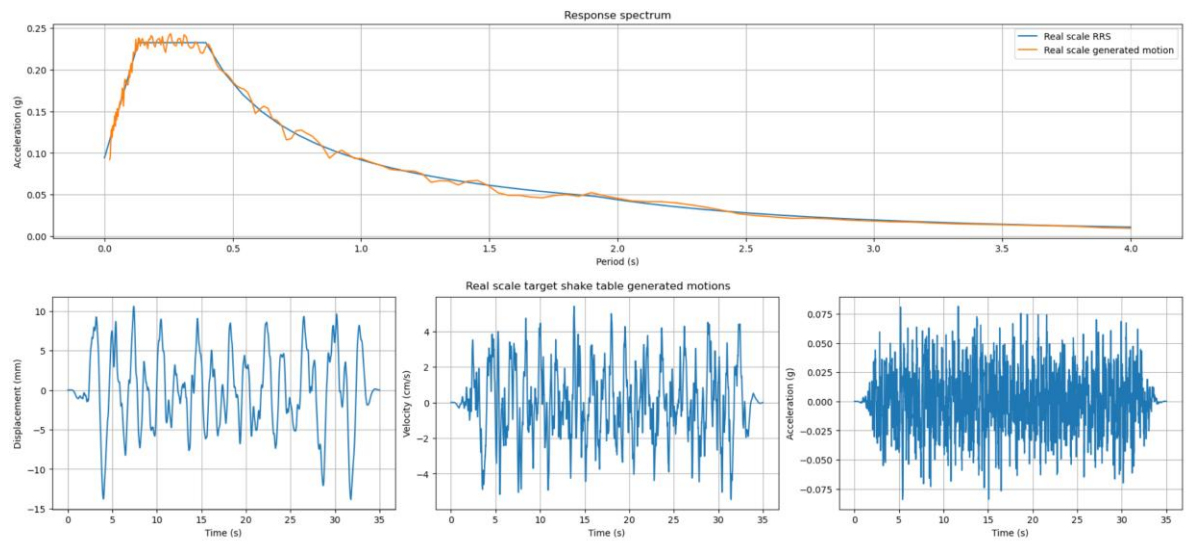
1. Extract the target real scale pseudo acceleration response spectrum (5% of critical damping) from the Excel file provided by the User Group (RRS0);



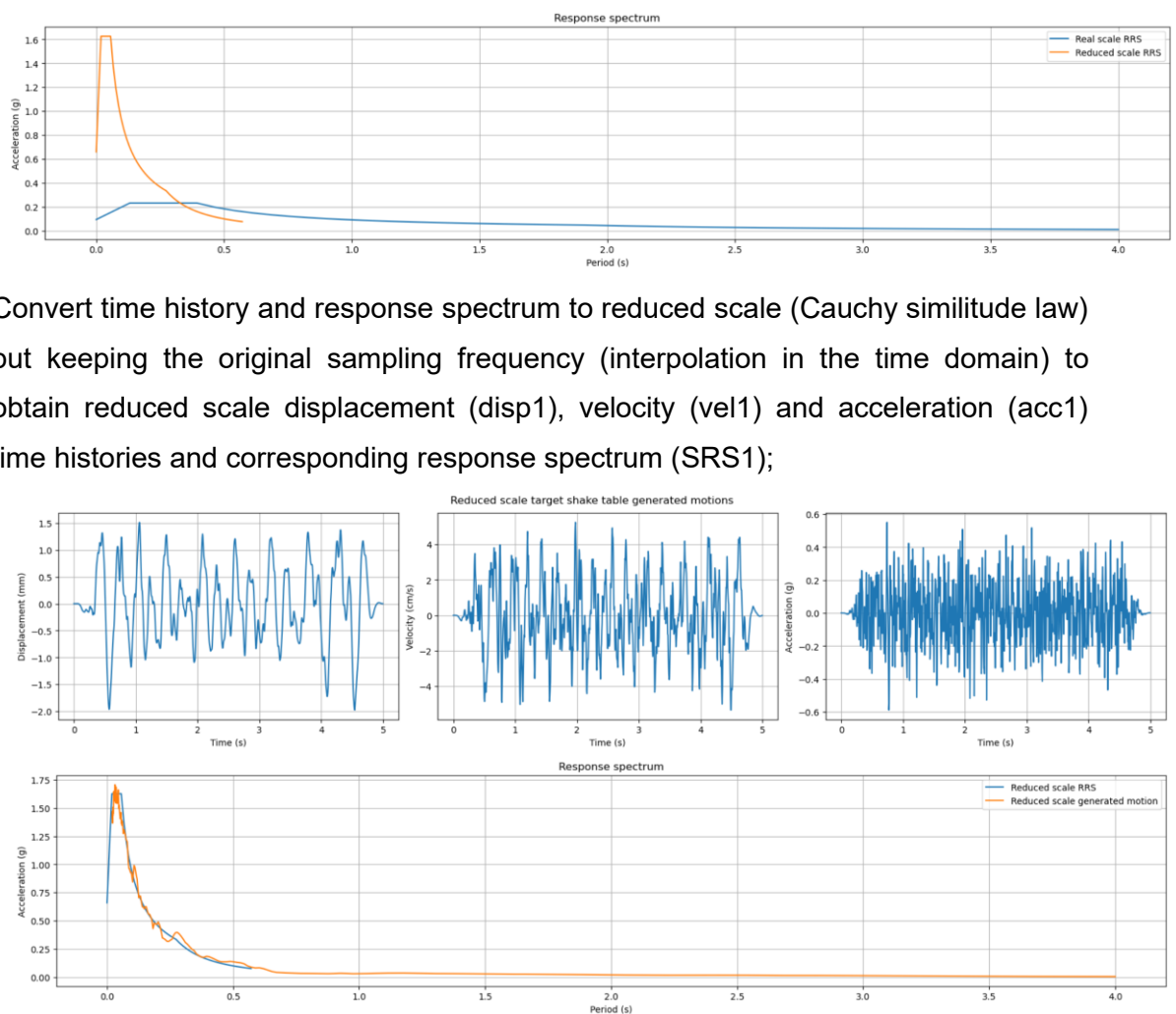
2. Interpolate the target real scale pseudo-acceleration response spectrum (200 logarithmically spaced frequencies between 0.25 Hz and 50 Hz) for time history generation (RS0);



3. Generate kinematically compatible real scale displacement (disp0), velocity (vel0) and acceleration (acc0) time histories, each with a duration of 35 seconds and compute the signal response spectrum (SRS0);

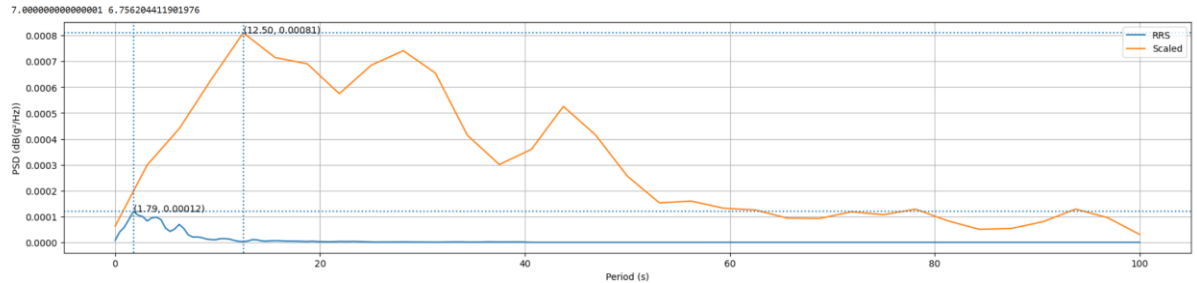


4. Convert target pseudo acceleration response spectrum to reduced scale pseudo acceleration response spectrum (5% of critical damping) using Cauchy similitude law (RRS1);

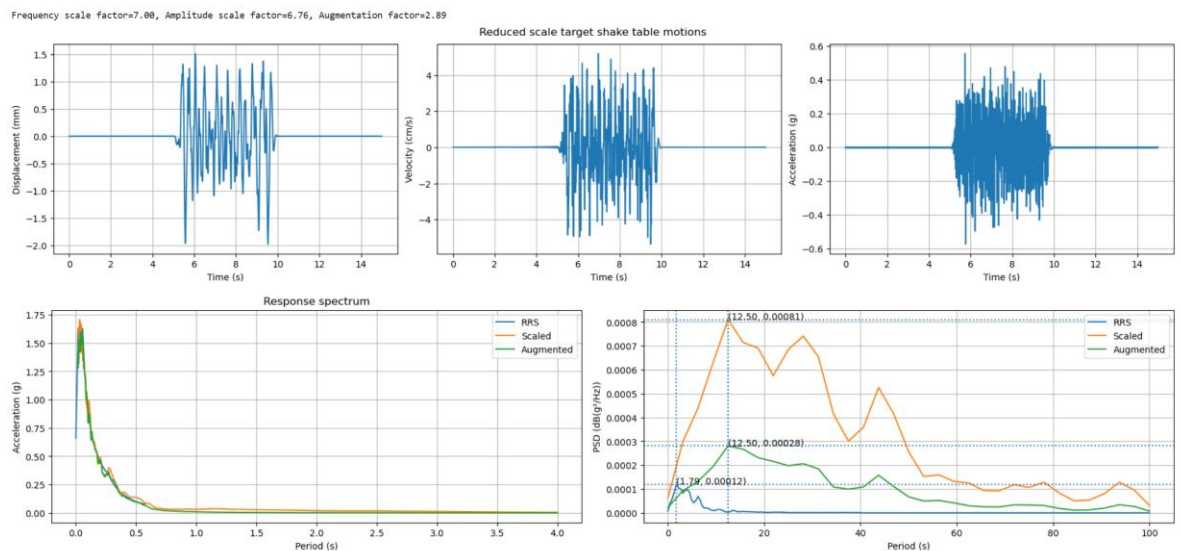


5. Convert time history and response spectrum to reduced scale (Cauchy similitude law) but keeping the original sampling frequency (interpolation in the time domain) to obtain reduced scale displacement (disp1), velocity (vel1) and acceleration (acc1) time histories and corresponding response spectrum (SRS1);

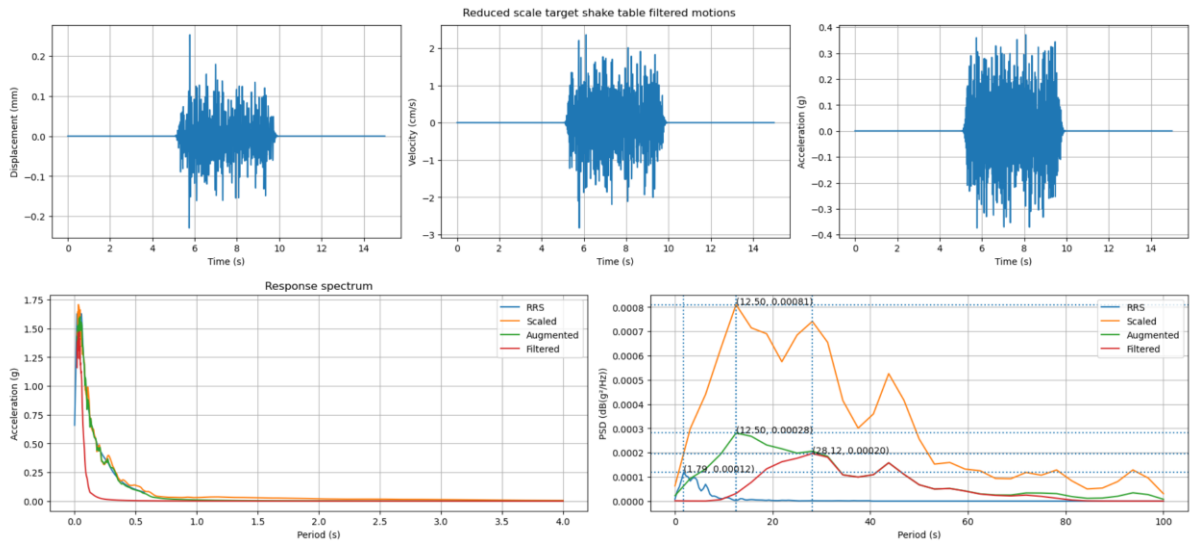
6. Compute the power spectral density of the real scale and reduced scale acceleration time histories (Nyquist frequency = 100Hz) to check results in the frequency domain;



7. Add 5 seconds of zeros in the beginning and at the end of the displacement time history (shake table operation requirement) to obtain a new reduced scale displacement (disp2) and recompute velocity (vel2) and acceleration (acc2) time histories and response spectrum (SRS2);



8. Apply a forward-backward band pass Butterworth filter between 15Hz and 40Hz followed by a Tukey window (shake table operation requirement) to obtain a new reduced scale displacement (disp3) and recompute velocity (vel3) and acceleration (acc3) time histories and response spectrum (SRS3);



9. Prepare data to be exported to an Excel file.

All these results are presented in the “outputN.xlsx” files (N=0 to 5) with separate tabs for each of the abovementioned time histories and response spectra. These will be combined in pairs to obtain the bidirectional motions for the shake table test:

- Set 1: N=0 for the transverse axis, N=1 for the longitudinal axis;
- Set 2: N=2 for the transverse axis, N=3 for the longitudinal axis;
- Set 3: N=4 for the transverse axis, N=5 for the longitudinal axis.

Only one set will be used for the shake table test. Other sets may be generated if deemed necessary during the shake table calibration procedure. This is currently a work in progress.

The orientation of the shake table transverse and longitudinal axes relative to the specimen is the following:

