Appendix A

Signal processing of the Augusta records

The processed motion data for the full set of the Augusta tests are shown herein. The baseline fitting scheme is implemented for the adjustment of the longitudinal records of the base, first, second and roof floor, namely the acceleration components obtained from the Augusta free vibration tests 1,3,4,5,6,8,9 and 10 : components GFL-25X-01, 1FL-25X-01, 2FL-25X-01, 3FL-X-01, GFL-25X-03, 1FL-25X-03, 2FL-25X-03, 3FL-X-03, GFL-25X-04, 1FL-25X-04, 2FL-25X-04, 3FL-X-04, GFL-25X-05, 1FL-25X-05, 2FL-25X-05, 3FL-X-05, GFL-25X-06, 1FL-25X-06, 2FL-25X-06, 3FL-X-06, GFL-25X-08, 1FL-25X-08, 2FL-25X-08, 3FL-X-08, GFL-25X-09, 1FL-25X-09, 2FL-25X-09, 3FL-X-09, GFL-25X-10, 1FL-25X-10, 2FL-25X-10, 3FL-X-10.

The Appendix is organized as follows:

- Section A.1 provides information on the start times t_1, end times t_2 and motion durations t_d for the absolute and relative records obtained from the free vibration Augusta tests, see Tables A.1 to A.3. The thresholds ε_1 and ε_v and the time interval used for the identification of the linear velocity trend, which are needed for the estimation of times t_1 and t_2 are given in Tables A.1 and A.3.

- Section A.2 provides the peak free vibration response in terms of absolute floor accelerations, velocities and displacements, see Tables A.6 and A.7.

- Section A.3 provides the peak relative superstructure response in terms of absolute floor accelerations, velocities and displacements, see Tables A.6 to A.7.

- Sections A.4 to A.10 show the plots of the baseline fitted absolute response, the baseline fitted relative response evaluated indirectly from the adjusted absolute response and the baseline fitted relative response evaluated directly from the processing of the row relative signals for tests 1, 3, 4, 5, 6, 8 and 10. The results for test 9 can be found in the main text and are not repeated herein. The absolute response presented in the above mentioned sections includes absolute floor accelerations, velocities and displacements. The relative response consists in relative floor accelerations, velocities, displacements and inter-story drifts.

A.1 Motion duration - tables

Table A.1: Duration of strong motion for tests 1, 3 and 4. First column: start time of absolute motion t_1^{abs}. Second column: end time of absolute motion t_2^{abs}. Third column: duration of absolute motion $t_d^{abs} = t_2^{abs} - t_1^{abs}$. Fourth column: start time of absolute motion t_1^{rel}. Fifth column: end time of absolute motion t_2^{rel}. Sixth column: duration of relative motion $t_d^{rel} = t_2^{rel} - t_1^{rel}$ (within brackets the relative motion duration as evaluated from the absolute motion start and end times, i.e. $t_d^{rel} = t_2^{abs} - t_1^{abs,groundfloor}$).

$Test\,1$ ($u_0 = 5.83cm$)	$t_1^{abs}[sec]$	$t_2^{abs}[sec]$	$t_d^{abs}[sec]$	$t_1^{rel}[sec]$	$t_2^{rel}[sec]$	$t_d^{rel}[sec]$
ground floor record	415.075	417.280	2.205			
first floor record	415.081	417.290	2.209	415.075	417.200	2.125 (2.215)
second floor record	415.099	417.300	2.201	415.075	417.210	2.135 (2.225)
roof record	415.103	417.310	2.207	415.075	417.220	2.145 (2.235)

$Test\,3$ ($u_0 = 6.81cm$)	$t_1^{abs}[sec]$	$t_2^{abs}[sec]$	$t_d^{abs}[sec]$	$t_1^{rel}[sec]$	$t_2^{rel}[sec]$	$t_d^{rel}[sec]$
ground floor record	470.133	473.000	2.867			
first floor record	470.138	473.010	2.872	470.133	473.060	2.927 (2.877)
second floor record	470.145	473.020	2.875	470.133	473.060	2.927 (2.887)
roof record	470.164	473.050	2.886	470.133	473.070	2.937 (2.917)

$Test\,4$ ($u_0 = 6.83cm$)	$t_1^{abs}[sec]$	$t_2^{abs}[sec]$	$t_d^{abs}[sec]$	$t_1^{rel}[sec]$	$t_2^{rel}[sec]$	$t_d^{rel}[sec]$
ground floor record	463.620	466.500	2.880			
first floor record	463.624	466.530	2.906	463.620	466.560	2.940 (2.910)
second floor record	463.632	466.560	2.928	463.620	466.590	2.970 (2.940)
roof record	463.651	466.580	2.929	463.620	466.600	2.980 (2.960)

Table A.2: Duration of strong motion for tests 5, 6 and 8. First column: start time of absolute motion t_1^{abs}. Second column: end time of absolute motion t_2^{abs}. Third column: duration of absolute motion $t_d^{abs} = t_2^{abs} - t_1^{abs}$. Fourth column: start time of absolute motion t_1^{rel}. Fifth column: end time of absolute motion t_2^{rel}. Sixth column: duration of relative motion $t_d^{rel} = t_2^{rel} - t_1^{rel}$ (within brackets the relative motion duration as evaluated from the absolute motion start and end times, i.e. $t_d^{rel} = t_2^{abs} - t_1^{abs,groundfloor}$).

$Test\,5$ ($u_0 = 10.88cm$)	$t_1^{abs}[sec]$	$t_2^{abs}[sec]$	$t_d^{abs}[sec]$	$t_1^{rel}[sec]$	$t_2^{rel}[sec]$	$t_d^{rel}[sec]$
ground floor record	1067.992	1071.220	3.228			
first floor record	1067.997	1071.228	3.231	1067.992	1071.955	3.963 (3.236)
second floor record	1068.004	1071.233	3.229	1067.992	1071.956	3.964 (3.241)
roof record	1068.024	1071.234	3.210	1067.992	1071.957	3.965 (3.242)

$Test\,6$ ($u_0 = 11.66cm$)	$t_1^{abs}[sec]$	$t_2^{abs}[sec]$	$t_d^{abs}[sec]$	$t_1^{rel}[sec]$	$t_2^{rel}[sec]$	$t_d^{rel}[sec]$
ground floor record	1215.377	1219.400	4.023			
first floor record	1215.383	1219.430	4.047	1215.377	1219.430	4.053 (4.053)
second floor record	1215.389	1219.440	4.051	1215.377	1219.440	4.063 (4.063)
roof record	1215.409	1219.460	4.051	1215.377	1219.440	4.063 (4.083)

$Test\,8$ ($u_0 = 10.33cm$)	$t_1^{abs}[sec]$	$t_2^{abs}[sec]$	$t_d^{abs}[sec]$	$t_1^{rel}[sec]$	$t_2^{rel}[sec]$	$t_d^{rel}[sec]$
ground floor record	385.165	389.200	4.035			
first floor record	385.171	389.240	4.069	385.165	389.220	4.055 (4.075)
second floor record	385.177	389.250	4.073	385.165	389.240	4.075 (4.085)
roof record	385.200	389.260	4.060	385.165	389.320	4.155 (4.095)

Table A.3: Duration of strong motion for tests 9 and 10. First column: start time of absolute motion t_1^{abs}. Second column: end time of absolute motion t_2^{abs}. Third column: duration of absolute motion $t_d^{abs} = t_2^{abs} - t_1^{abs}$. Fourth column: start time of absolute motion t_1^{rel}. Fifth column: end time of absolute motion t_2^{rel}. Sixth column: duration of relative motion $t_d^{rel} = t_2^{rel} - t_1^{rel}$ (within brackets the relative motion duration as evaluated from the absolute motion start and end times, i.e. $t_d^{rel} = t_2^{abs} - t_1^{abs,groundfloor}$).

$Test\,9$ ($u_0 = 10.11cm$)	$t_1^{abs}[sec]$	$t_2^{abs}[sec]$	$t_d^{abs}[sec]$	$t_1^{rel}[sec]$	$t_2^{rel}[sec]$	$t_d^{rel}[sec]$
ground floor record	1014.087	1018.000	3.913			
first floor record	1014.092	1018.049	3.957	1014.087	1018.150	4.063 (3.962)
second floor record	1014.109	1018.170	4.061	1014.087	1018.170	4.083 (4.083)
roof record	1014.122	1018.220	4.098	1014.087	1018.210	4.123 (4.133)

$Test\,10$ ($u_0 = 10.02cm$)	$t_1^{abs}[sec]$	$t_2^{abs}[sec]$	$t_d^{abs}[sec]$	$t_1^{rel}[sec]$	$t_2^{rel}[sec]$	$t_d^{rel}[sec]$
ground floor record	1052.849	1056.810	3.961			
first floor record	1052.855	1056.820	3.965	1052.849	1056.920	4.071 (3.971)
second floor record	1052.862	1056.840	3.978	1052.850	1056.920	4.070 (3.991)
roof record	1052.878	1056.920	4.042	1052.849	1056.940	4.091 (4.071)

Table A.4: Intervals of time where there is a clear linear trend in the row absolute and/or relative velocity trace. A straight line is drawn in this interval and extended until time t_1.

Test 1:	$[420, 430]sec$	*Test 6:*	$[1225, 1235]sec$
Test 3:	$[480, 490]sec$	*Test 8:*	$[395, 405]sec$
Test 4:	$[470, 480]sec$	*Test 9:*	$[1020, 1030]sec$
Test 5:	$[1075, 1085]sec$	*Test 10:*	$[1060, 1070]sec$

Table A.5: Thresholds ε_1 and ε_v used for the determination of start and times times of strong absolute and relative motion (sub-scripts $'abs'$ and $'rel'$ respectively).

	Test 1 : thresholds in %				*Test 3 : thresholds in %*				*Test 4 : thresholds in %*			
floor	ε_1^{abs}	ε_v^{abs}	ε_1^{rel}	ε_v^{rel}	ε_1^{abs}	ε_v^{abs}	ε_1^{rel}	ε_v^{rel}	ε_1^{abs}	ε_v^{abs}	ε_1^{rel}	ε_v^{rel}
ground	1.00	0.90			1.00	0.30			2.00	0.10		
first	0.10	1.00	1.00	1.00	8.00	0.30	8.00	1.00	2.00	0.10	2.00	0.40
second	1.00	1.00	1.00	0.90	8.00	0.30	8.00	1.00	10.00	0.10	2.00	0.40
roof	1.00	1.10	1.00	1.00	8.00	0.30	8.00	0.40	10.00	0.10	2.00	0.40

	Test 5 : thresholds in %				*Test 6 : thresholds in %*				*Test 8 : thresholds in %*			
floor	ε_1^{abs}	ε_v^{abs}	ε_1^{rel}	ε_v^{rel}	ε_1^{abs}	ε_v^{abs}	ε_1^{rel}	ε_v^{rel}	ε_1^{abs}	ε_v^{abs}	ε_1^{rel}	ε_v^{rel}
ground	2.00	1.00			2.00	0.28			2.00	0.20		
first	2.00	1.00	2.00	0.28	2.00	0.25	2.00	0.10	2.00	0.30	2.00	0.40
second	2.00	1.00	2.00	0.16	2.00	0.26	2.00	0.01	2.00	0.45	2.00	0.80
roof	5.00	1.00	2.00	0.28	5.00	0.26	2.00	0.01	8.00	0.15	2.00	0.20

	Test 9 : thresholds in %				*Test 10 : thresholds in %*			
floor	ε_1^{abs}	ε_v^{abs}	ε_1^{rel}	ε_v^{rel}	ε_1^{abs}	ε_v^{abs}	ε_1^{rel}	ε_v^{rel}
ground	1.00	0.10			2.00	1.50		
first	2.00	0.10	2.00	0.60	2.00	1.70	2.00	0.80
second	10.00	0.20	2.00	1.20	2.00	1.65	2.00	0.70
roof	12.00	0.20	2.00	0.20	2.00	1.50	2.00	0.25

A.2 Peak absolute free vibration response - tables

Table A.6: Peak free vibration response of the Augusta building in terms of absolute floor acceleration, velocity and displacement during tests 1, 3, 4, 5 and 8.

	Test 1 : Peak absolute response			*Test 3 : Peak absolute response*		
	accel.[*g*]	*vel.*[*cm/sec*]	*displ.*[*cm*]	*accel.*[*g*]	*vel.*[*cm/sec*]	*displ.*[*cm*]
ground floor	0.126	9.54	5.83	0.320	12.42	6.81
first floor	0.118	9.43	5.83	0.231	12.25	6.81
second floor	0.106	9.66	5.83	0.161	12.87	6.81
roof	0.100	9.56	5.83	0.219	13.04	6.82

	Test 4 : Peak absolute response			*Test 5 : Peak absolute response*		
	accel.[*g*]	*vel.*[*cm/sec*]	*displ.*[*cm*]	*accel.*[*g*]	*vel.*[*cm/sec*]	*displ.*[*cm*]
ground floor	0.329	11.47	6.85	0.419	17.29	10.88
first floor	0.195	11.27	6.85	0.268	16.81	10.88
second floor	0.158	11.85	6.85	0.199	17.69	10.88
roof	0.214	11.97	6.85	0.286	18.25	10.88

	Test 6 : Peak absolute response			*Test 8 : Peak absolute response*		
	accel.[*g*]	*vel.*[*cm/sec*]	*displ.*[*cm*]	*accel.*[*g*]	*vel.*[*cm/sec*]	*displ.*[*cm*]
ground floor	0.425	18.13	11.66	0.419	17.57	10.33
first floor	0.261	17.66	11.66	0.279	17.26	10.33
second floor	0.218	18.42	11.66	0.205	18.10	10.33
roof	0.295	19.06	11.66	0.291	18.68	10.34

Table A.7: Peak free vibration response of the Augusta building in terms of absolute floor acceleration, velocity and displacement during tests 9 and 10.

	Test 9 : Peak absolute response			*Test 10 : Peak absolute response*		
	accel.[*g*]	*vel.*[*cm/sec*]	*displ.*[*cm*]	*accel.*[*g*]	*vel.*[*cm/sec*]	*displ.*[*cm*]
ground floor	0.374	15.70	10.11	0.363	15.41	10.02
first floor	0.252	15.43	10.11	0.257	15.25	10.02
second floor	0.177	16.12	10.11	0.174	16.05	10.02
roof	0.265	16.53	10.11	0.261	16.30	10.03

A.3 Peak relative superstructure response - tables

Table A.8: Peak relative to the base response for tests 1, 3 and 4. The relative response is evaluated directly from the baseline fitting of the row relative motion. The corresponding peak response evaluated from the fitted absolute response is given within brackets. First column: component considered. Second column: peak relative floor accelerations. Third column: peak relative floor velocities. Fourth column: peak relative floor displacements. Fifth column: peak relative floor displacements after application of a low cut filter with $f_c = 0.25Hz$ (test1) and $f_c = 0.30Hz$ (tests 3 and 4). Sixth column: peak inter-story drifts. Seventh column: peak inter-story drifts evaluated from filtered displacements.

Test 1 : Peak relative to the base response

floor	*acceleration* [g]	*velocity* [cm/sec]	*displacement* [cm]	*filtered displ.* [cm]	*drift* [10^{-3}]	*filtered drift* [10^{-3}]
first	0.120 (0.120)	1.680 (1.679)	0.072 (0.072)	0.076 (0.076)	0.169 (0.169)	0.178 (0.179)
second	0.173 (0.173)	3.009 (2.989)	0.125 (0.138)	0.132 (0.132)	0.187 (0.213)	0.175 (0.174)
third	0.167 (0.167)	3.055 (3.057)	0.128 (0.128)	0.132 (0.133)	0.118 (0.139)	0.064 (0.073)

Test 3 : Peak relative to the base response

floor	*acceleration* [g]	*velocity* [cm/sec]	*displacement* [cm]	*filtered displ.* [cm]	*drift* [10^{-3}]	*filtered drift* [10^{-3}]
first	0.297 (0.297)	2.701 (2.686)	0.103 (0.110)	0.098 (0.098)	0.242 (0.260)	0.232 (0.231)
second	0.336 (0.336)	4.234 (4.217)	0.153 (0.152)	0.161 (0.161)	0.195 (0.195)	0.196 (0.197)
third	0.370 (0.370)	5.056 (4.961)	0.215 (0.210)	0.220 (0.221)	0.191 (0.180)	0.182 (0.185)

Test 4 : Peak relative to the base response

floor	*acceleration* [g]	*velocity* [cm/sec]	*displacement* [cm]	*filtered displ.* [cm]	*drift* [10^{-3}]	*filtered drift* [10^{-3}]
first	0.304 (0.304)	2.739 (2.742)	0.086 (0.086)	0.089 (0.089)	0.202 (0.202)	0.209 (0.209)
second	0.338 (0.336)	4.100 (4.086)	0.144 (0.143)	0.151 (0.151)	0.185 (0.195)	0.195 (0.194)
third	0.349 (0.349)	4.753 (4.651)	0.203 (0.198)	0.207 (0.207)	0.182 (0.169)	0.173 (0.175)

Table A.9: Peak relative to the base response for tests 5, 6 and 8. The relative response is evaluated directly from the baseline fitting of the row relative motion. The corresponding peak response evaluated from the fitted absolute response is given within brackets. First column: component considered. Second column: peak relative floor accelerations. Third column: peak relative floor velocities. Fourth column: peak relative floor displacements. Fifth column: peak relative floor displacements after application of a low cut filter with $f_c = 0.30Hz$. Sixth column: peak inter-story drifts. Seventh column: peak inter-story drifts evaluated from filtered displacements.

Test 5 : Peak relative to the base response

floor	*acceleration* [g]	*velocity* [cm/sec]	*displacement* [cm]	*filtered displ.* [cm]	*drift* $[10^{-3}]$	*filtered drift* $[10^{-3}]$
first	0.403 (0.403)	3.688 (3.674)	0.144 (0.143)	0.136 (0.138)	0.339 (0.336)	0.321 (0.324)
second	0.437 (0.419)	5.920 (5.898)	0.231 (0.230)	0.229 (0.231)	0.273 (0.272)	0.288 (0.289)
third	0.467 (0.467)	7.077 (6.970)	0.319 (0.313)	0.313 (0.316)	0.269 (0.256)	0.256 (0.261)

Test 6 : Peak relative to the base response

floor	*acceleration* [g]	*velocity* [cm/sec]	*displacement* [cm]	*filtered displ.* [cm]	*drift* $[10^{-3}]$	*filtered drift* $[10^{-3}]$
first	0.402 (0.402)	3.806 (3.790)	0.140 (0.138)	0.148 (0.148)	0.329 (0.326)	0.349 (0.349)
second	0.443 (0.432)	5.965 (5.947)	0.231 (0.230)	0.240 (0.241)	0.288 (0.288)	0.289 (0.290)
third	0.483 (0.483)	7.104 (7.008)	0.322 (0.317)	0.324 (0.326)	0.281 (0.268)	0.257 (0.262)

Test 8 : Peak relative to the base response

floor	*acceleration* [g]	*velocity* [cm/sec]	*displacement* [cm]	*filtered displ.* [cm]	*drift* $[10^{-3}]$	*filtered drift* $[10^{-3}]$
first	0.358 (0.358)	3.703 (3.695)	0.206 (0.213)	0.152 (0.152)	0.484 (0.501)	0.358 (0.358)
second	0.403 (0.403)	5.891 (5.886)	0.228 (0.227)	0.243 (0.243)	0.283 (0.284)	0.285 (0.285)
third	0.485 (0.485)	6.840 (6.706)	0.316 (0.309)	0.325 (0.328)	0.272 (0.251)	0.254 (0.262)

Table A.10: Peak relative to the base response for tests 9 and 10. The relative response is evaluated directly from the baseline fitting of the row relative motion. The corresponding peak response evaluated from the fitted absolute response is given within brackets. First column: component considered. Second column: peak relative floor accelerations. Third column: peak relative floor velocities. Fourth column: peak relative floor displacements. Fifth column: peak relative floor displacements after application of a low cut filter with $f_c = 0.30Hz$. Sixth column: peak inter-story drifts. Seventh column: peak inter-story drifts evaluated from filtered displacements.

Test 9 : Peak relative to the base response

$floor$	$acceleration$ [g]	$velocity$ [cm/sec]	$displacement$ [cm]	$filtered\, displ.$ [cm]	$drift$ [10^{-3}]	$filtered\, drift$ [10^{-3}]
first	0.345 (0.345)	3.402 (3.384)	0.130 (0.129)	0.126 (0.125)	0.306 (0.302)	0.295 (0.295)
second	0.391 (0.391)	5.396 (5.348)	0.211 (0.208)	0.207 (0.206)	0.260 (0.249)	0.255 (0.254)
third	0.420 (0.420)	6.287 (6.075)	0.290 (0.278)	0.281 (0.283)	0.242 (0.305)	0.226 (0.236)

Test 10 : Peak relative to the base response

$floor$	$acceleration$ [g]	$velocity$ [cm/sec]	$displacement$ [cm]	$filtered\, displ.$ [cm]	$drift$ [10^{-3}]	$filtered\, drift$ [10^{-3}]
first	0.332 (0.332)	3.252 (3.250)	0.116 (0.116)	0.123 (0.123)	0.273 (0.273)	0.290 (0.291)
second	0.394 (0.394)	5.172 (5.180)	0.194 (0.195)	0.208 (0.208)	0.271 (0.252)	0.264 (0.264)
third	0.415 (0.415)	6.002 (5.951)	0.272 (0.269)	0.278 (0.279)	0.349 (0.230)	0.216 (0.218)

A.4 TEST 1-graphs

Baseline fitted absolute free vibration response

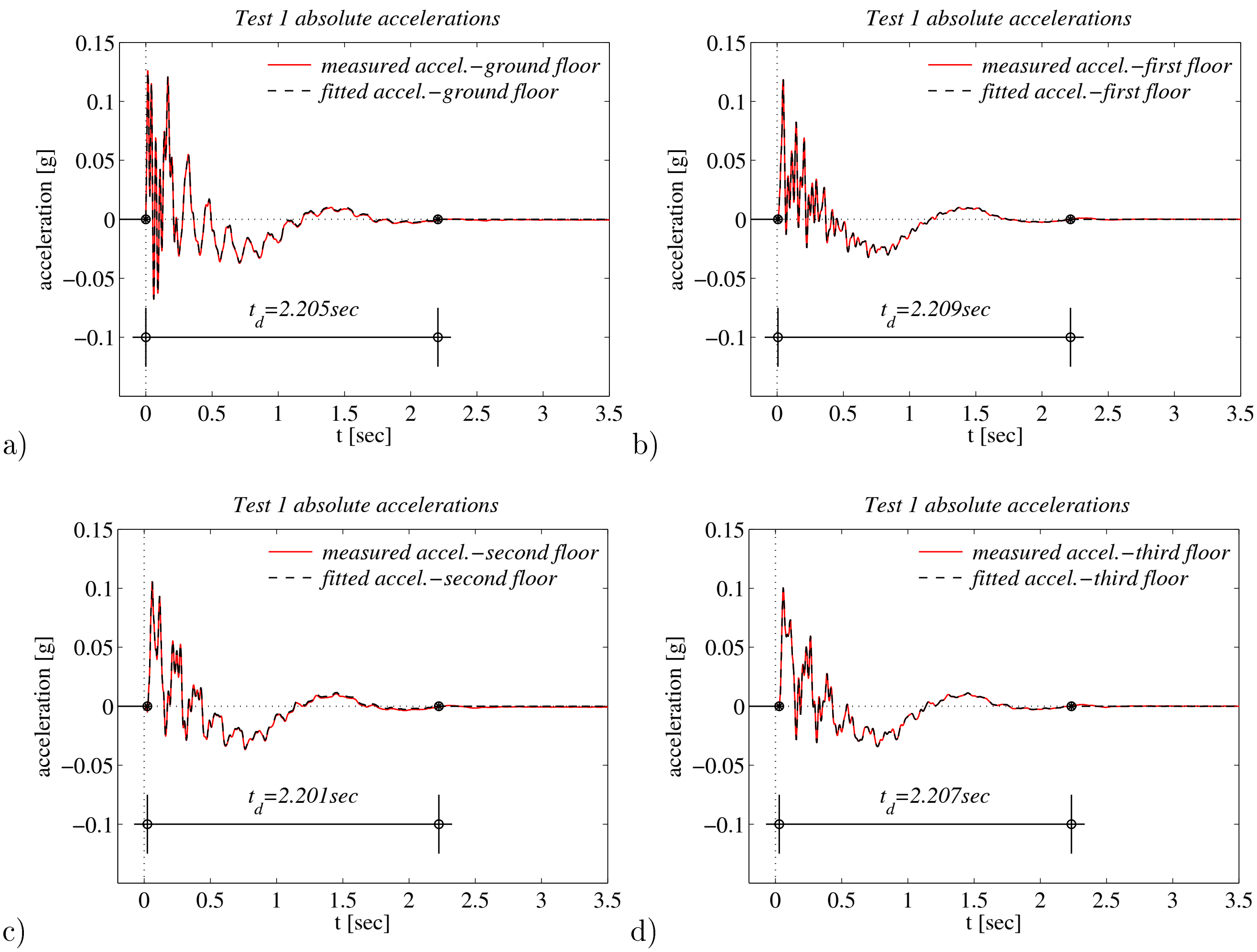


Figure A.1: Absolute acceleration response of the Augusta building during test 1: ground floor, first floor, second floor and roof response; sub-plots a), b), c), d) respectively. The row signals are represented by red lines while the baseline fitted signals are shown by black lines. The times when motion starts and ceases are indicated by black markers. The duration of strong motion is given.

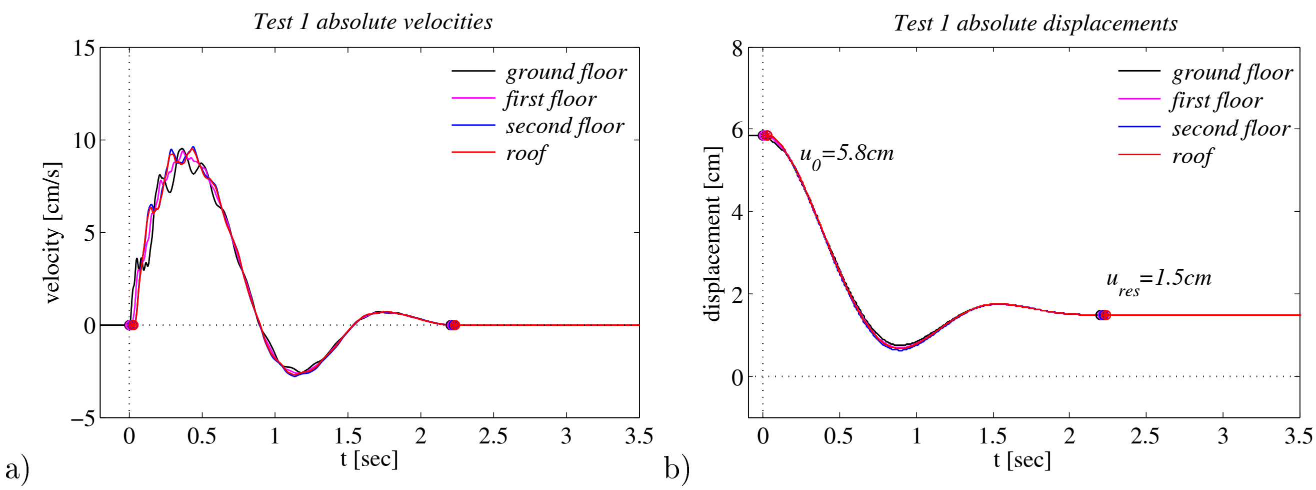


Figure A.2: Adjusted absolute velocities and displacements at the ground floor, first floor, second floor and roof of the Augusta building during test 1; sub-plots a) and b) respectively. The times when motion starts and ceases are indicated by markers. The motion starts and ends somewhat later at the upper floors.

Test 1: Relative superstructure response evaluated from the processed absolute response

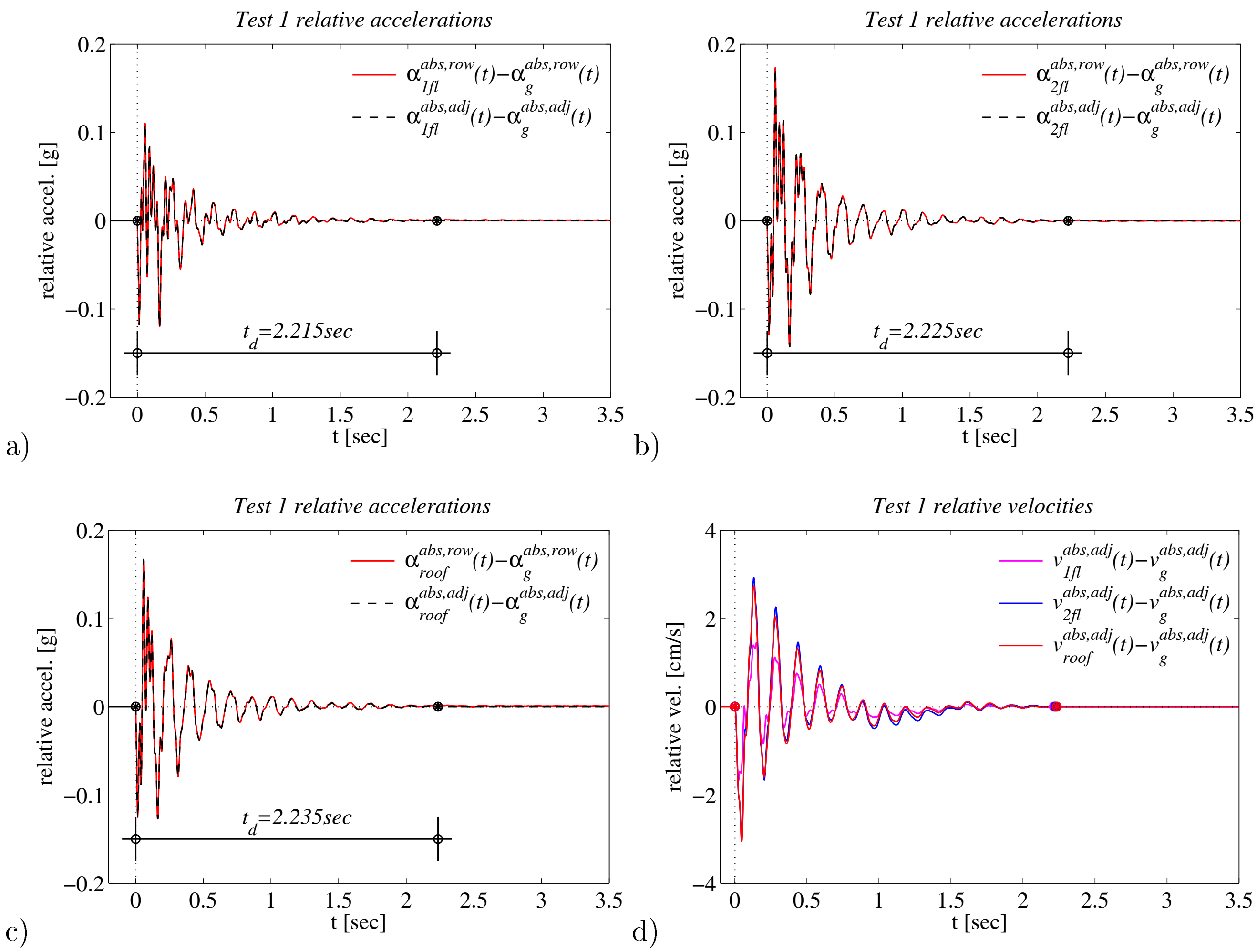


Figure A.3: Relative acceleration response at the Augusta superstructure under test 1 at first floor, second floor and roof; sub-plots a), b), c) respectively. The row signals are represented by red lines while the baseline fitted signals are shown by black lines. Sub-plot d) shows the relative floor velocities. The times when motion starts and ceases are indicated by markers. *('abs': absolute response, 'row': unprocessed response, 'adj': adjusted response, '1fl, 2fl, roof': first floor, second floor and roof response)*

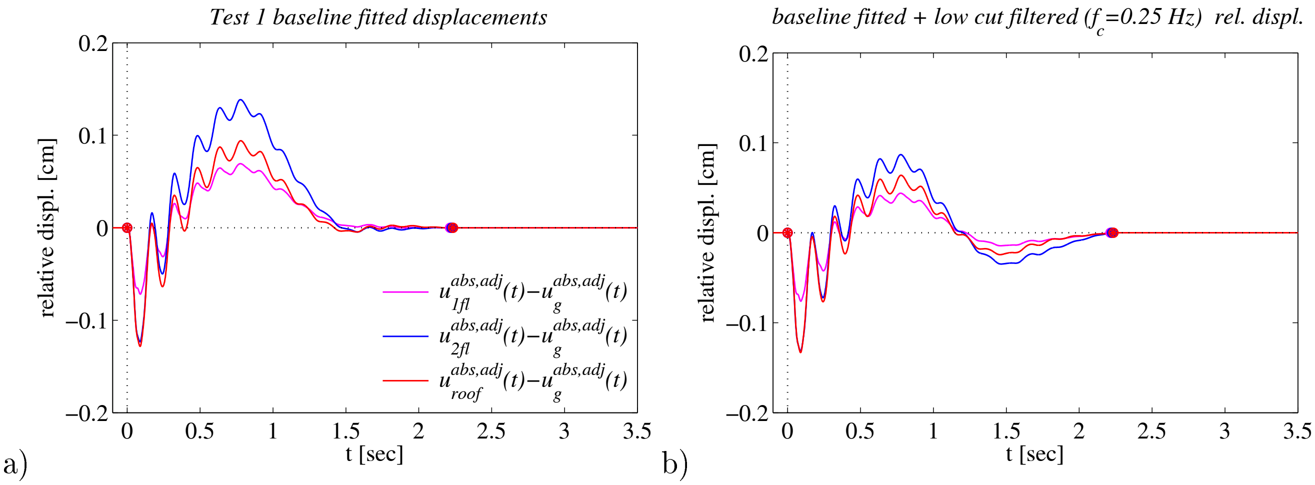


Figure A.4: Relative displacements at the Augusta superstructure during test 1; sub-plot a). Sub-plot b) shows the relative floor displacements of sub-plot a) after application of a low cut filter with corner frequency equal to $f_c = 0.25Hz$. The times when motion starts and ceases are indicated by markers. *('abs': absolute response, 'row': unprocessed response, 'adj': adjusted response, '1fl, 2fl, roof': first floor, second floor and roof response)*

Test 1: Relative superstructure response evaluated from the baseline fitting of the row relative motion

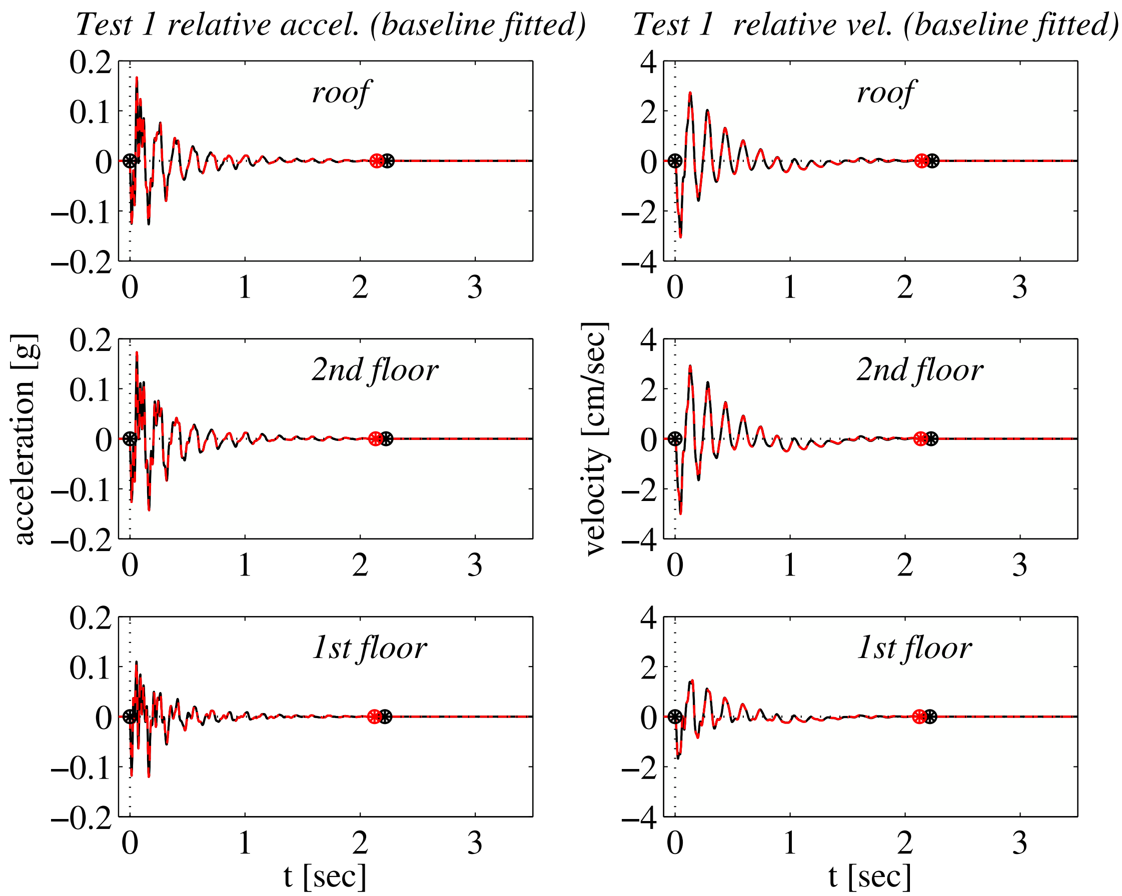


Figure A.5: Relative floor accelerations and velocities for the Augusta free vibration test 1, as evaluated from the adjusted absolute response (continuous black lines) and the adjusted relative response (dashed red lines); left sub-plots and right sub-plots respectively. The relative response is zero at the beginning and end of motion, since the superstructure is expected to respond in the linear range under such a small excitation. The times when motion starts and ceases are indicated by markers.

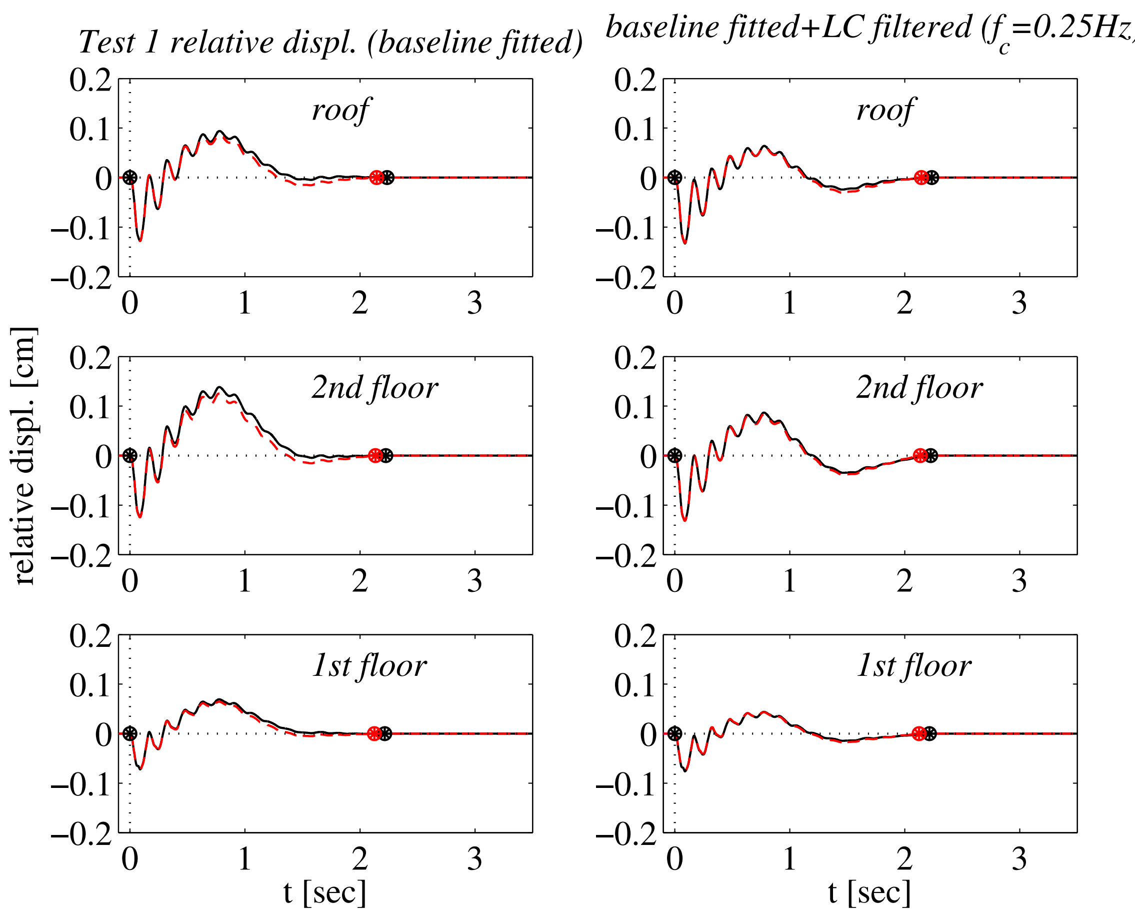


Figure A.6: Relative floor displacement histories for the Augusta free vibration test 1, as evaluated from the adjusted absolute response (continuous black lines) and the adjusted relative response (dashed red lines); left sub-plots. The relative displacements are zero at the beginning and end of motion, since the superstructure is expected to respond in the linear range under such a small excitation. The right sub-plots represent the same displacements after implementation of a low cut filter with corner frequency $f_c = 0.25Hz$. After filtering, the relative displacement responses obtained by the two procedures become essentially the same. The times when motion starts and ceases are indicated by markers.

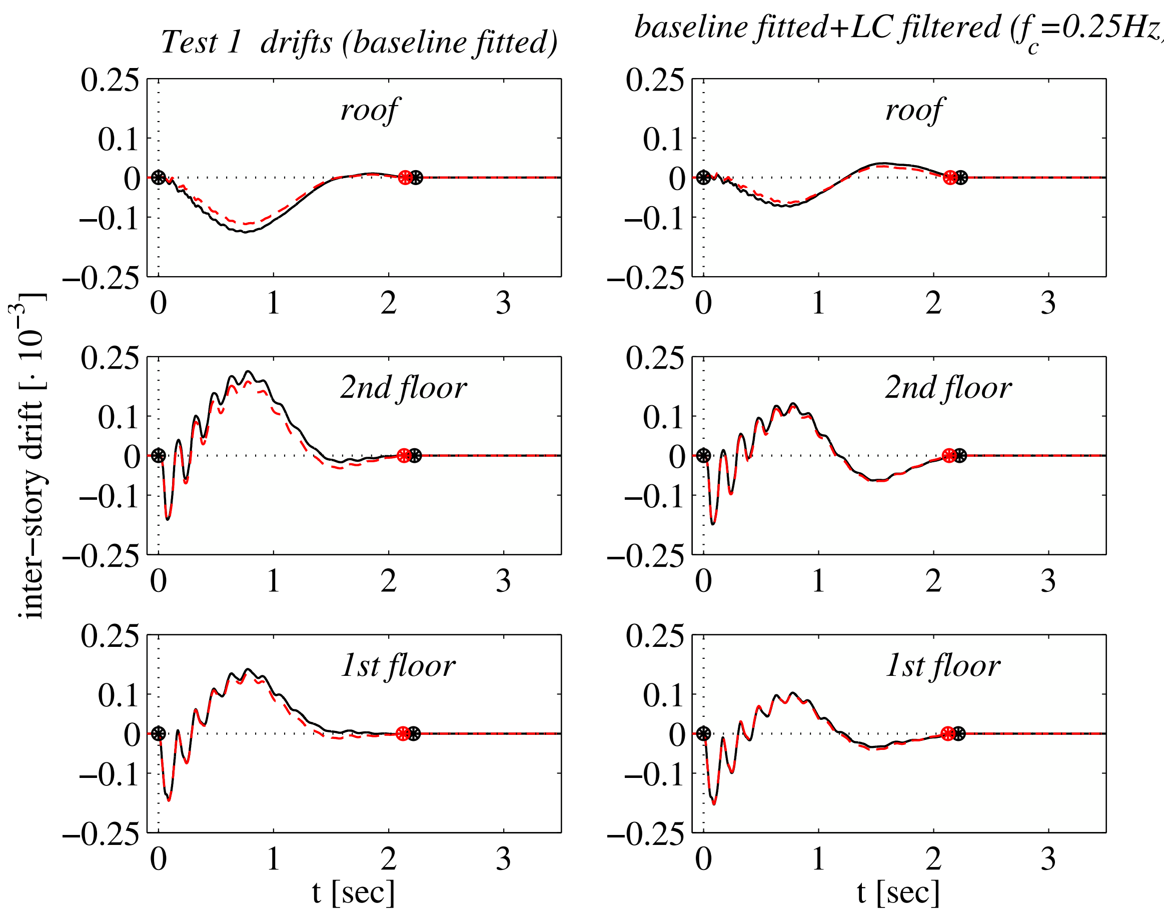


Figure A.7: Inter-story drift histories for the Augusta free vibration test 1, as evaluated from the adjusted absolute response (continuous black lines) and the adjusted relative response (dashed red lines); left sub-plots. The drifts are zero at the beginning and end of motion, since the superstructure is expected to respond in the linear range under such a small excitation. The right sub-plots represent the drifts evaluated from the corresponding filtered displacements. After filtering, the drifts obtained by the two procedures become essentially the same. The times when motion starts and ceases are indicated by markers.

A.5 TEST 3-graphs

Baseline fitted absolute free vibration response

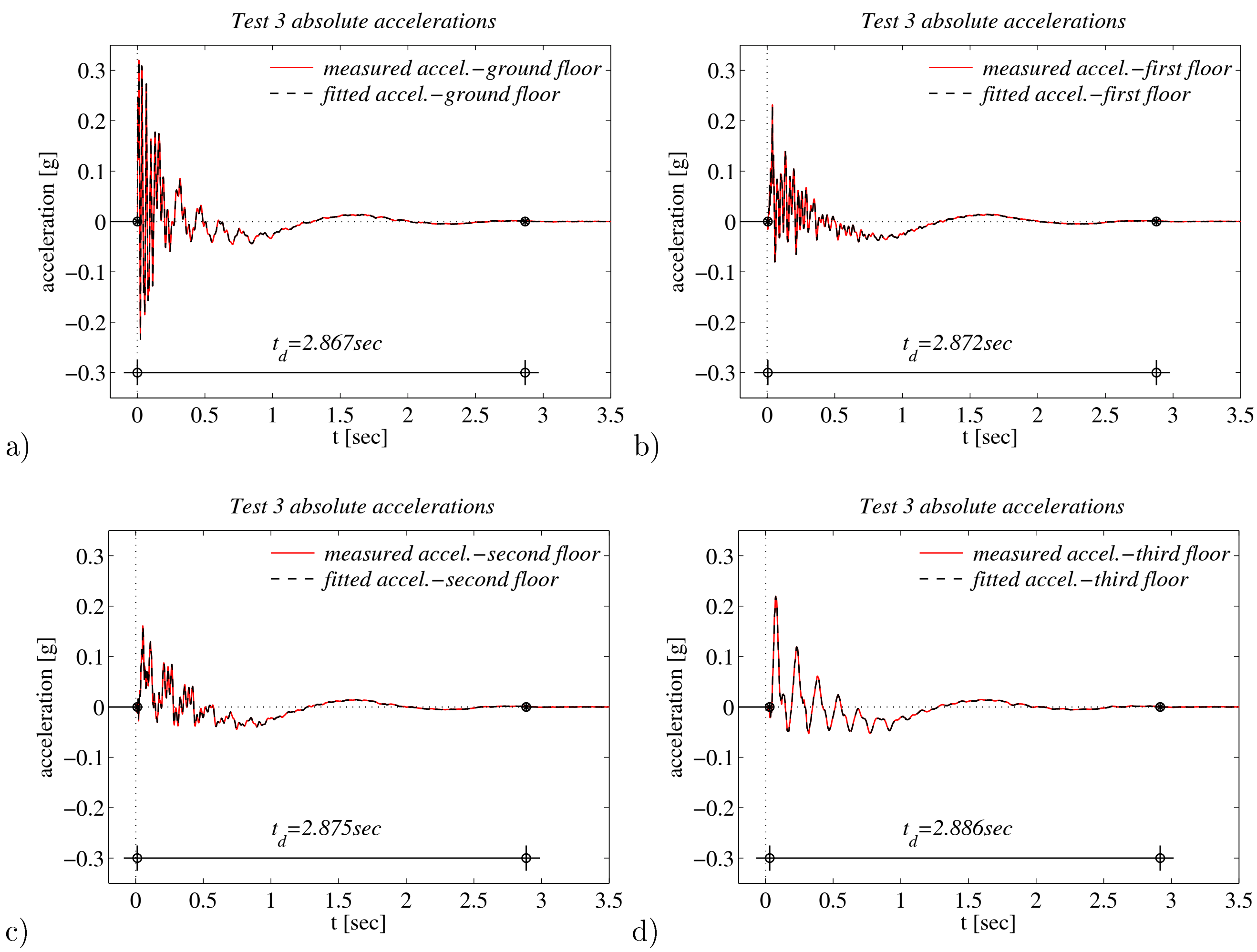
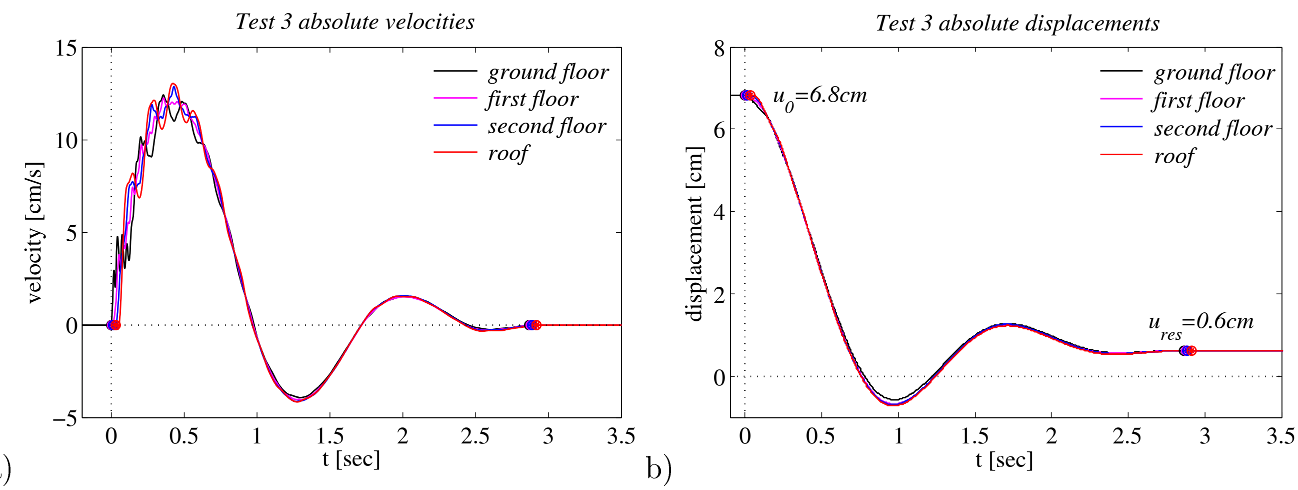


Figure A.8: Absolute acceleration response of the Augusta building during test 6: ground floor, first floor, second floor and roof response; sub-plots a), b), c), d) respectively. The row signals are represented by red lines while the baseline fitted signals are shown by black lines. The times when motion starts and ceases are indicated by black markers. The duration of strong motion is given.



a) b)

Figure A.9: Adjusted absolute velocities and displacements at the ground floor, first floor, second floor and roof of the Augusta building during test 6; sub-plots a) and b) respectively. The times when motion starts and ceases are indicated by markers. The motion starts and ends somewhat later at the upper floors.

Test 3: Relative superstructure response evaluated from the processed absolute response

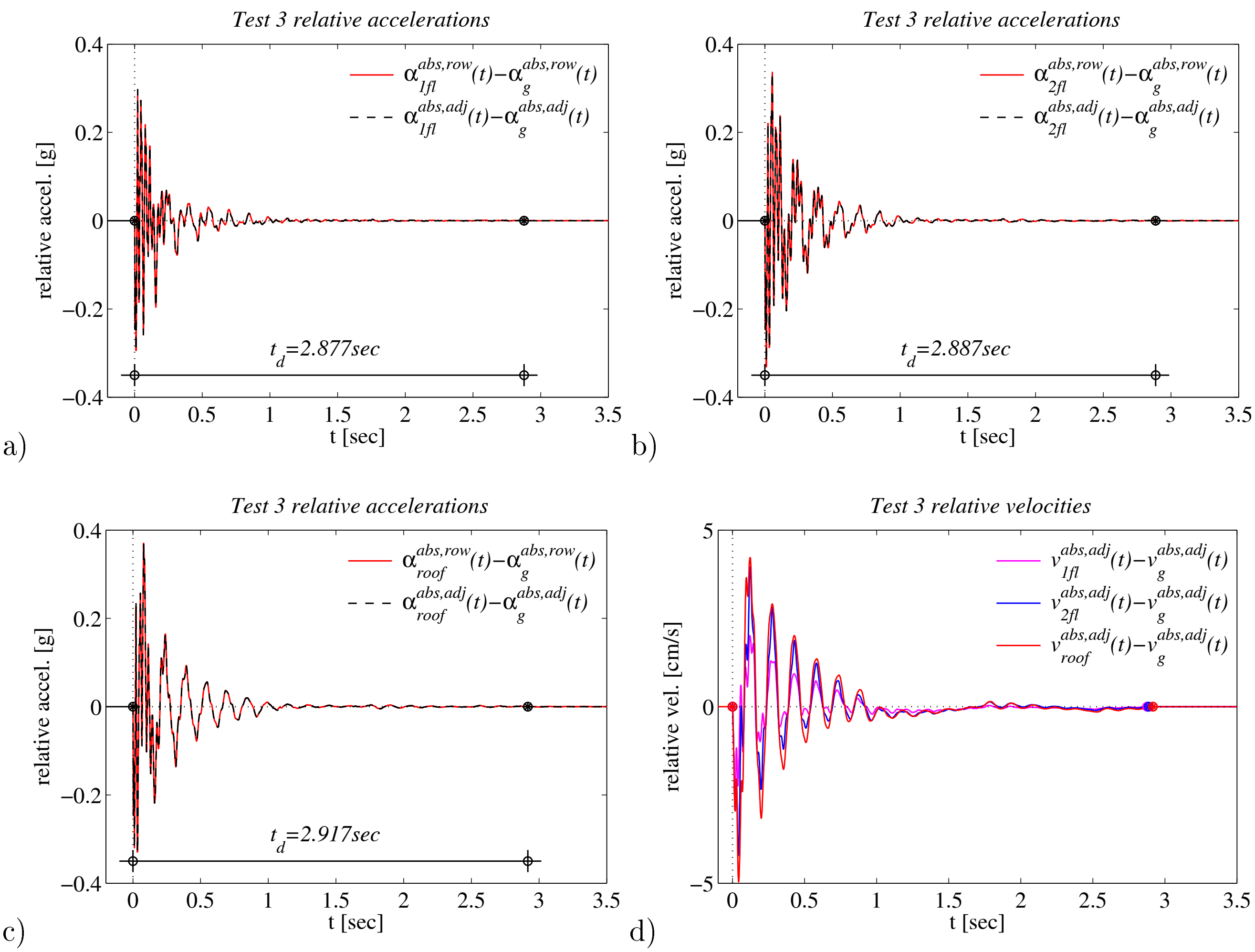
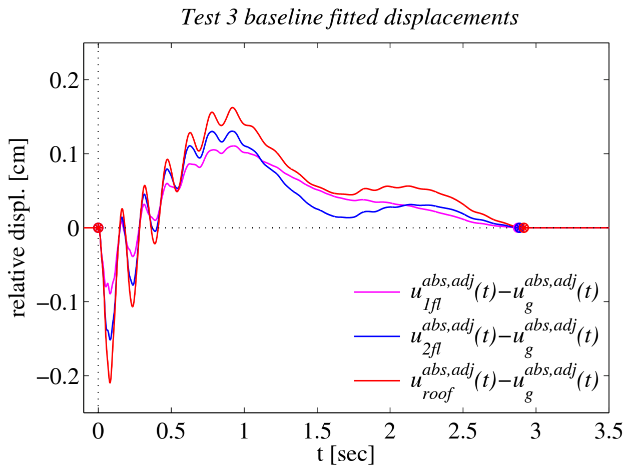
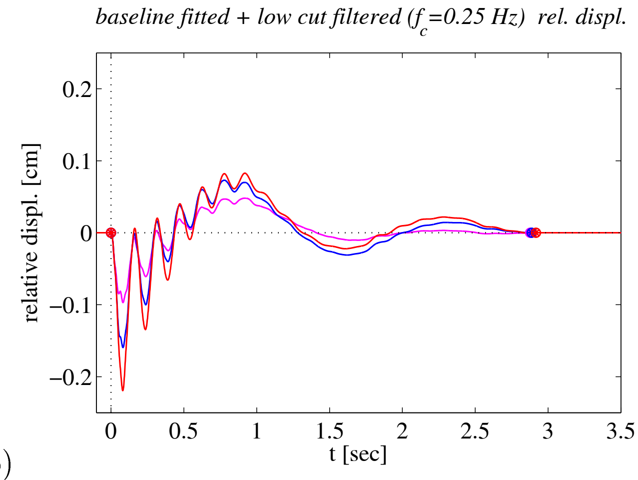


Figure A.10: Relative acceleration response at the Augusta superstructure under test 6 at first floor, second floor and roof; sub-plots a), b), c) respectively. The row signals are represented by red lines while the baseline fitted signals are shown by black lines. Sub-plot d) shows the relative floor velocities. The times when motion starts and ceases are indicated by markers. *('abs': absolute response, 'row': unprocessed response, 'adj': adjusted response, '1fl, 2fl, roof': first floor, second floor and roof response)*



a)



b)

Figure A.11: Relative displacements at the Augusta superstructure during test 3; sub-plot a). Sub-plot b) shows the relative floor displacements of sub-plot a) after application of a low cut filter with corner frequency equal to $f_c = 0.30Hz$. The times when motion starts and ceases are indicated by markers. *('abs': absolute response, 'row': unprocessed response, 'adj': adjusted response, '1fl, 2fl, roof': first floor, second floor and roof response)*

Test 3: Relative superstructure response evaluated from the baseline fitting of the row relative motion

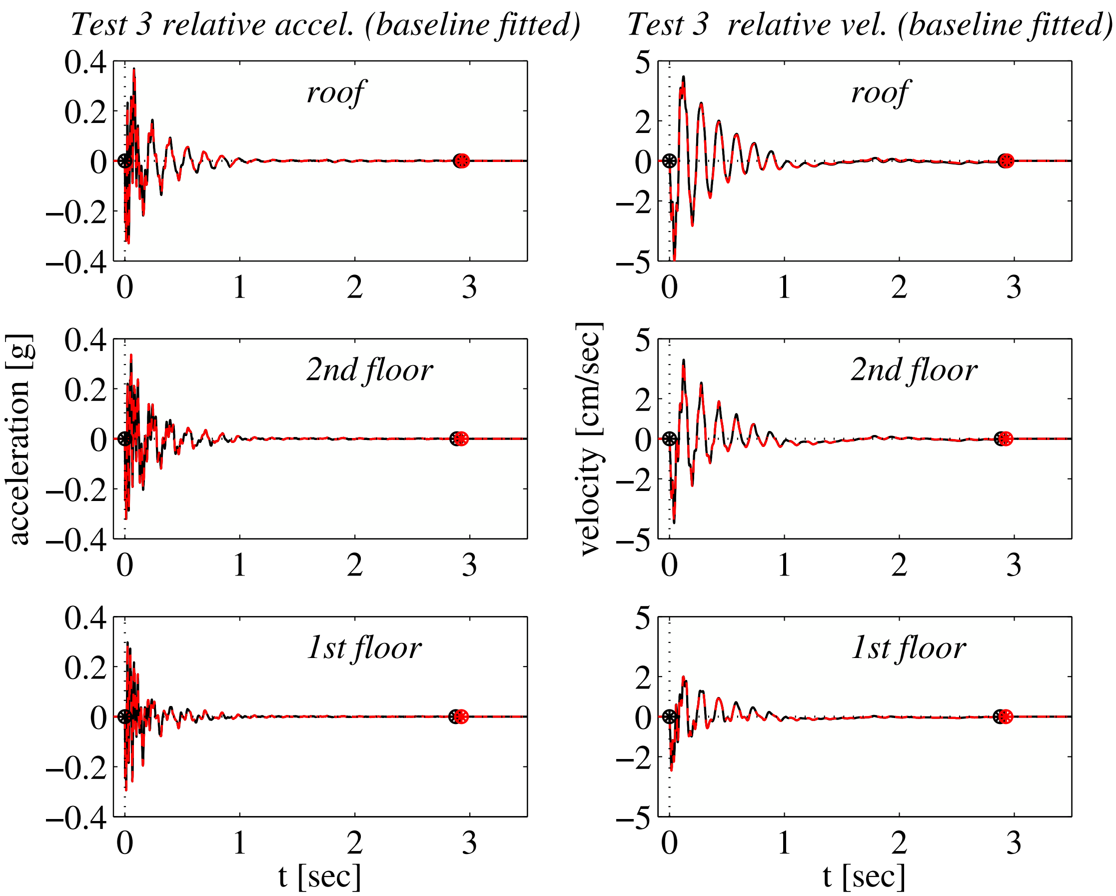


Figure A.12: Relative floor accelerations and velocities for the Augusta free vibration test 3, as evaluated from the adjusted absolute response (continuous black lines) and the adjusted relative response (dashed red lines); left sub-plots and right sub-plots respectively. The relative response is zero at the beginning and end of motion, since the superstructure is expected to respond in the linear range under such a small excitation. The times when motion starts and ceases are indicated by markers.

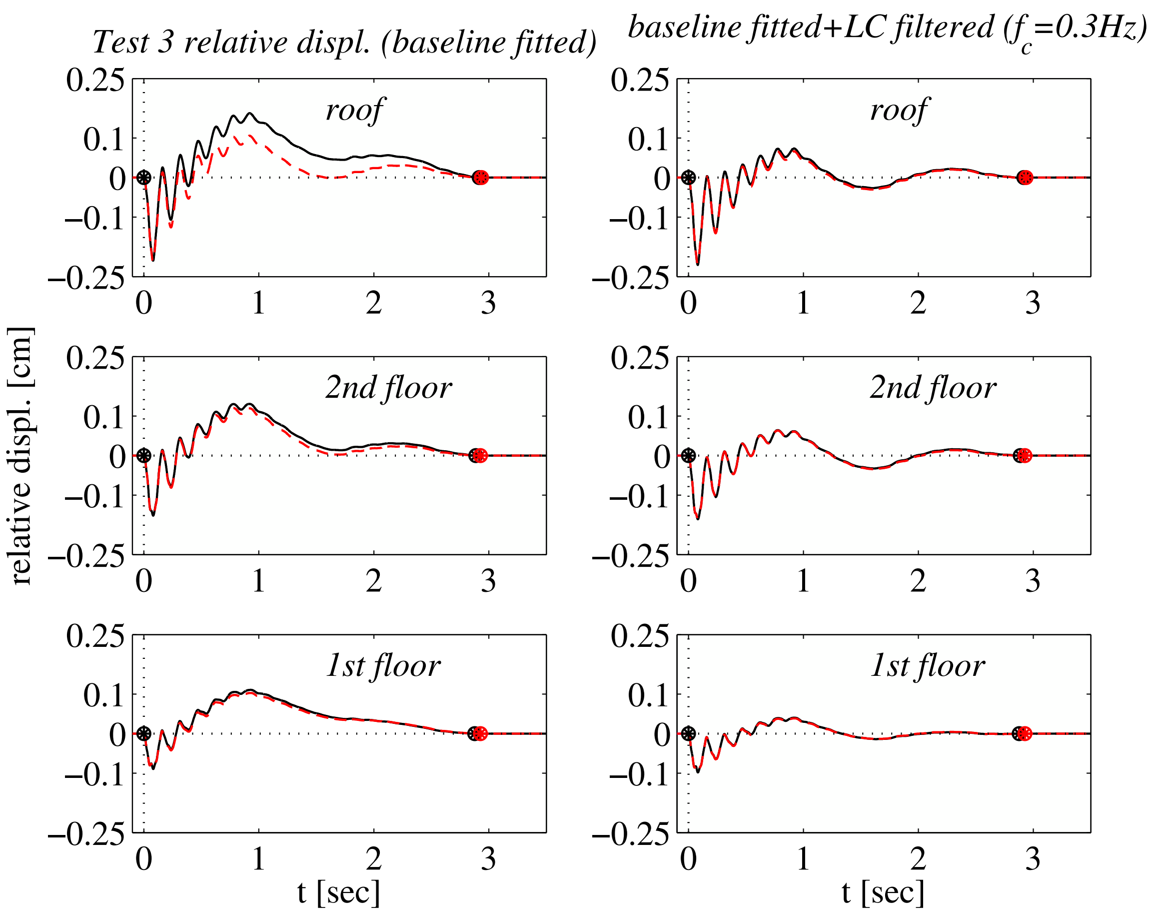


Figure A.13: Relative floor displacement histories for the Augusta free vibration test 3, as evaluated from the adjusted absolute response (continuous black lines) and the adjusted relative response (dashed red lines); left sub-plots. The relative displacements are zero at the beginning and end of motion, since the superstructure is expected to respond in the linear range under such a small excitation. The right sub-plots represent the same displacements after implementation of a low cut filter with corner frequency $f_c = 0.30Hz$. After filtering the relative displacement responses obtained by the two procedures become essentially the same. The times when motion starts and ceases are indicated by markers.

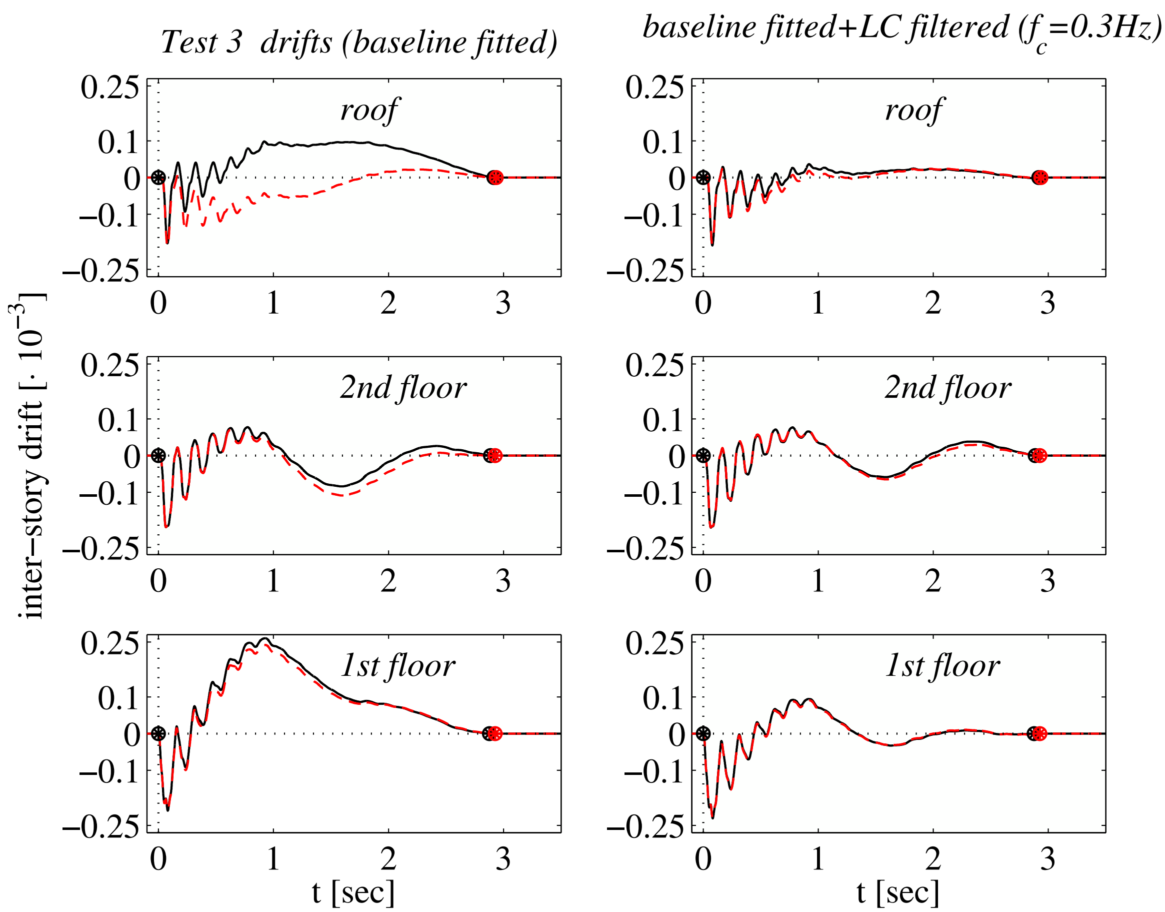


Figure A.14: Inter-story drift histories for the Augusta free vibration test 3, as evaluated from the adjusted absolute response (continuous black lines) and the adjusted relative response (dashed red lines); left sub-plots. The drifts are zero at the beginning and end of motion, since the superstructure is expected to respond in the linear range under such a small excitation. The right sub-plots represent the drifts evaluated from the corresponding filtered displacements. After filtering, the drifts obtained by the two procedures become essentially the same. The times when motion starts and ceases are indicated by markers.

A.6 TEST 4-graphs

Baseline fitted absolute free vibration response

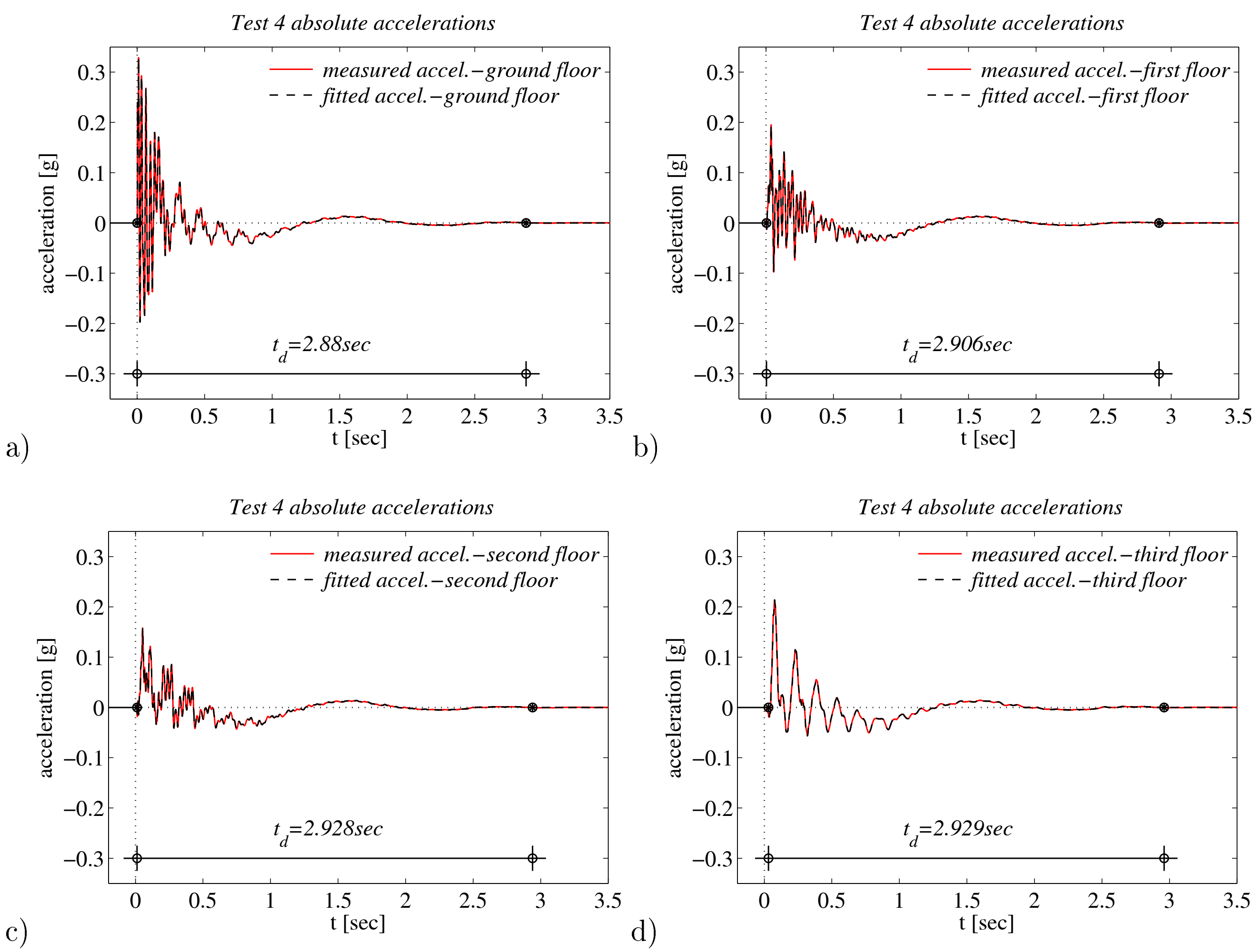


Figure A.15: Absolute acceleration response of the Augusta building during test 4: ground floor, first floor, second floor and roof response; sub-plots a), b), c), d) respectively. The row signals are represented by red lines while the baseline fitted signals are shown by black lines. The times when motion starts and ceases are indicated by black markers. The duration of strong motion is given.

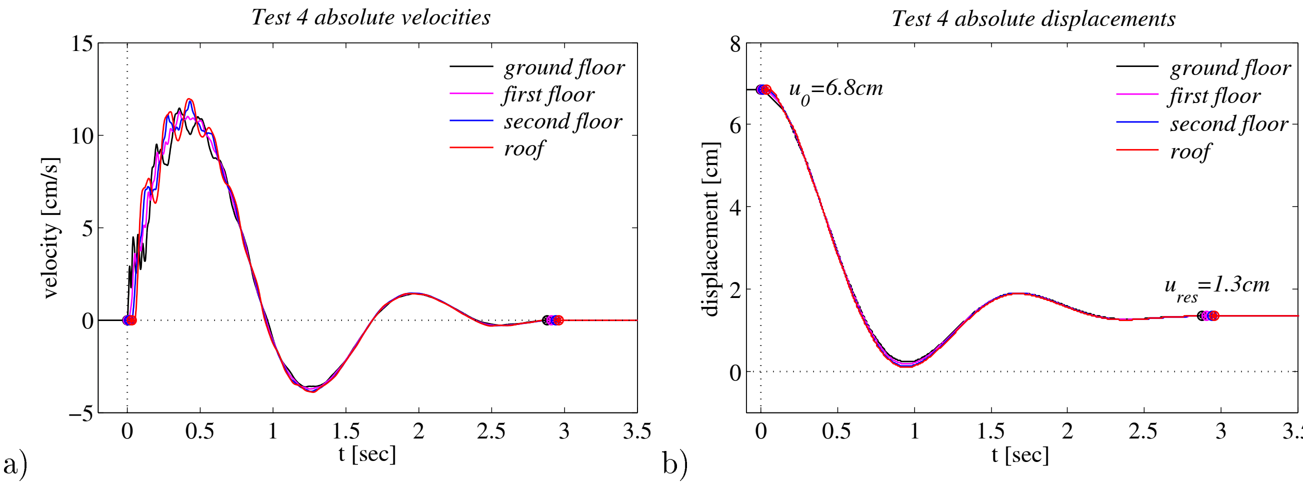


Figure A.16: Adjusted absolute velocities and displacements at the ground floor, first floor, second floor and roof of the Augusta building during test 4; sub-plots a) and b) respectively. The times when motion starts and ceases are indicated by markers. The motion starts and ends somewhat later at the upper floors.

Test 4: Relative superstructure response evaluated from the processed absolute response

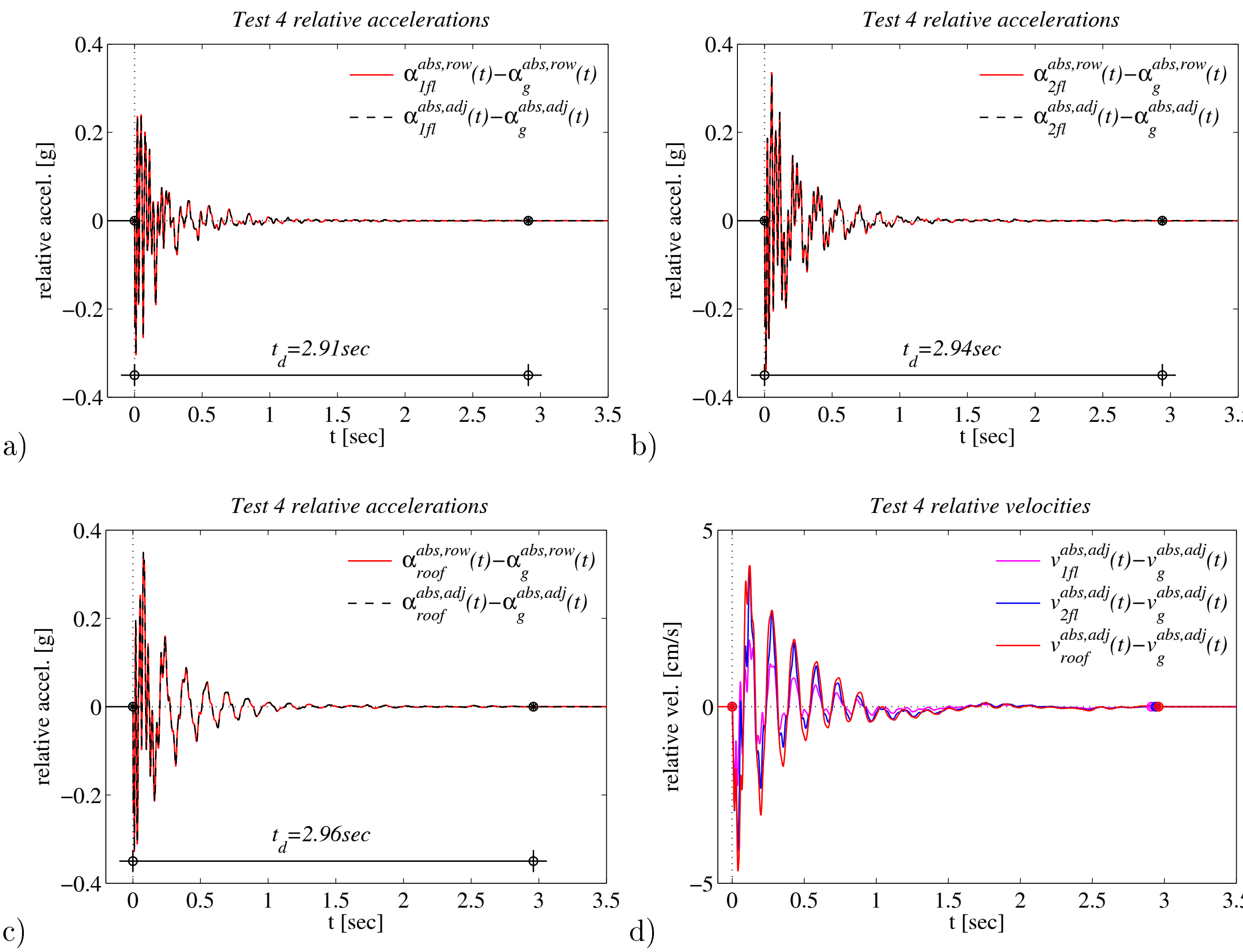


Figure A.17: Relative acceleration response at the Augusta superstructure under test 6 at first floor, second floor and roof; sub-plots a), b), c) respectively. The row signals are represented by red lines while the baseline fitted signals are shown by black lines. Sub-plot d) shows the relative floor velocities. The times when motion starts and ceases are indicated by markers. *('abs': absolute response, 'row': unprocessed response, 'adj': adjusted response, '1fl, 2fl, roof': first floor, second floor and roof response)*

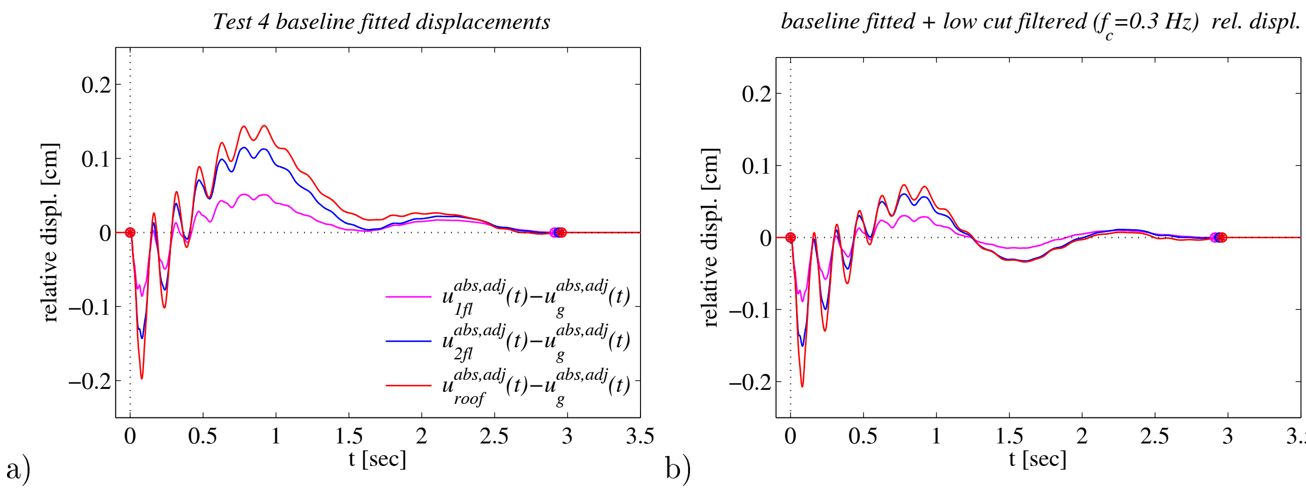


Figure A.18: Relative displacements at the Augusta superstructure during test 4; sub-plot a). Sub-plot b) shows the relative floor displacements of sub-plot a) after application of a low cut filter with corner frequency equal to $f_c = 0.30Hz$. The times when motion starts and ceases are indicated by markers. *('abs': absolute response, 'row': unprocessed response, 'adj': adjusted response, '1fl, 2fl, roof': first floor, second floor and roof response)*

Test 4: Relative superstructure response evaluated from the baseline fitting of the row relative motion

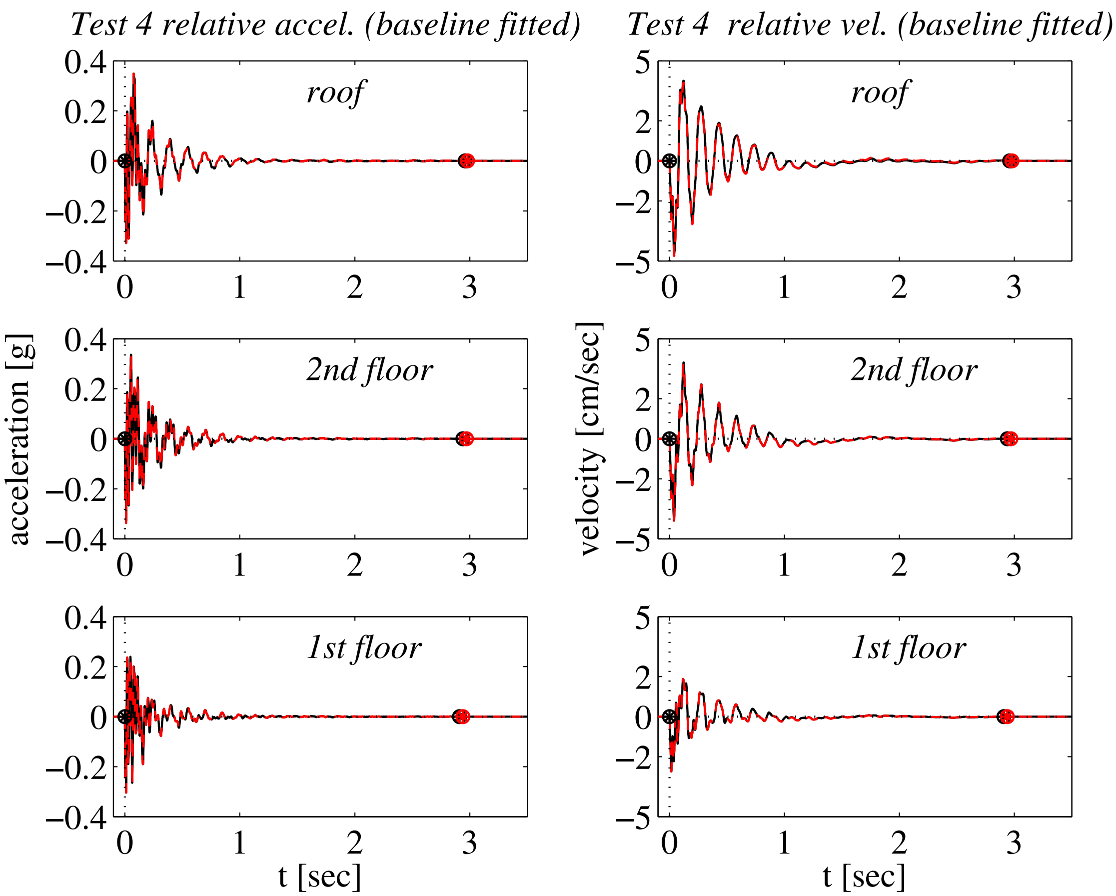


Figure A.19: Relative floor accelerations and velocities for the Augusta free vibration test 4, as evaluated from the adjusted absolute response (continuous black lines) and the adjusted relative response (dashed red lines); left sub-plots and right sub-plots respectively. The relative response is zero at the beginning and end of motion, since the superstructure is expected to respond in the linear range under such a small excitation. The times when motion starts and ceases are indicated by markers.

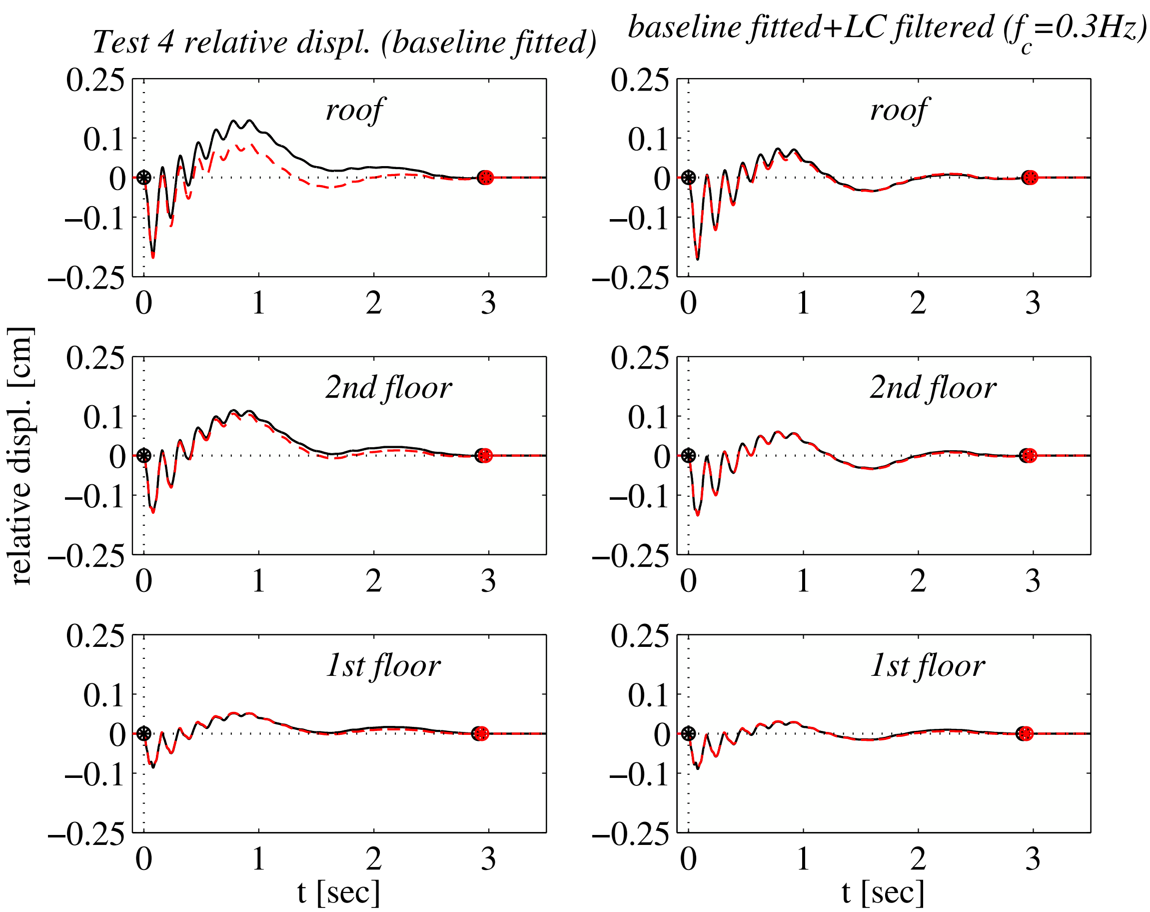


Figure A.20: Relative floor displacement histories for the Augusta free vibration test 4, as evaluated from the adjusted absolute response (continuous black lines) and the adjusted relative response (dashed red lines); left sub-plots. The relative displacements are zero at the beginning and end of motion, since the superstructure is expected to respond in the linear range under such a small excitation. The right sub-plots represent the same displacements after implementation of a low cut filter with corner frequency $f_c = 0.30Hz$. After filtering the relative displacement responses obtained by the two procedures become essentially the same. The times when motion starts and ceases are indicated by markers.

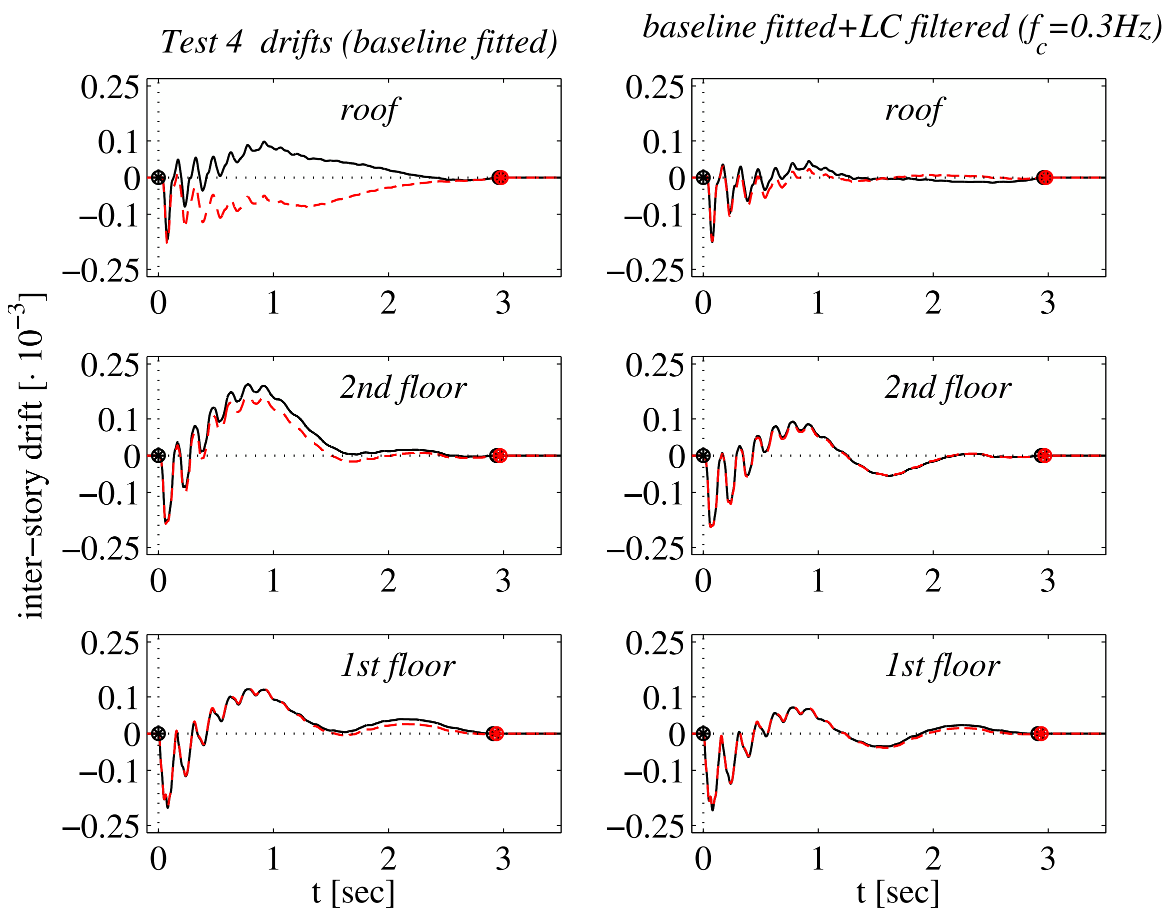


Figure A.21: Inter-story drift histories for the Augusta free vibration test 4, as evaluated from the adjusted absolute response (continuous black lines) and the adjusted relative response (dashed red lines); left sub-plots. The drifts are zero at the beginning and end of motion, since the superstructure is expected to respond in the linear range under such a small excitation. The right sub-plots represent the drifts evaluated from the corresponding filtered displacements. After filtering, the drifts obtained by the two procedures become essentially the same. The times when motion starts and ceases are indicated by markers.

A.7 TEST 5-graphs

Baseline fitted absolute free vibration response

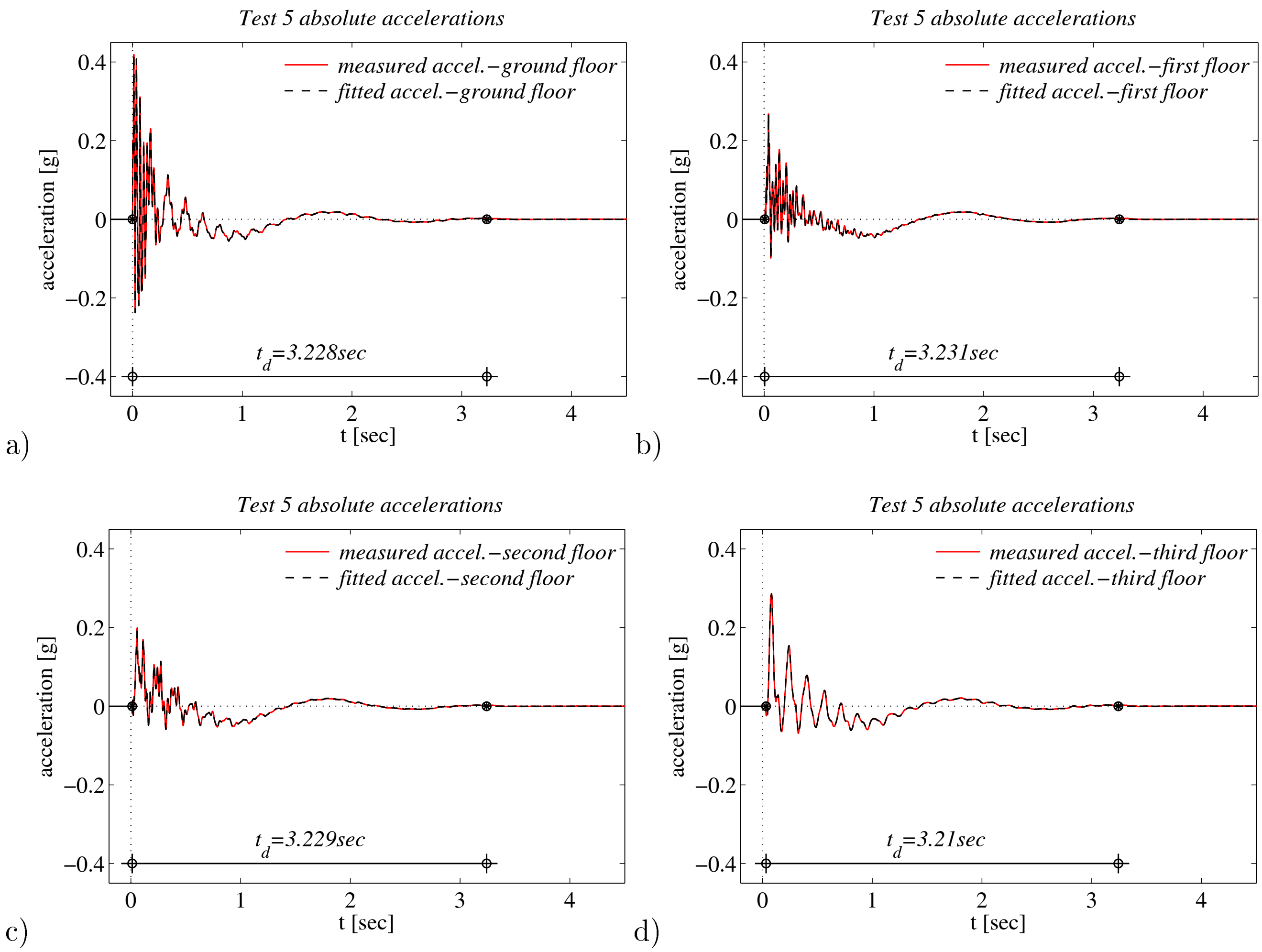


Figure A.22: Absolute acceleration response of the Augusta building during test 5: ground floor, first floor, second floor and roof response; sub-plots a), b), c), d) respectively. The row signals are represented by red lines while the baseline fitted signals are shown by black lines. The times when motion starts and ceases are indicated by black markers. The duration of strong motion is given.

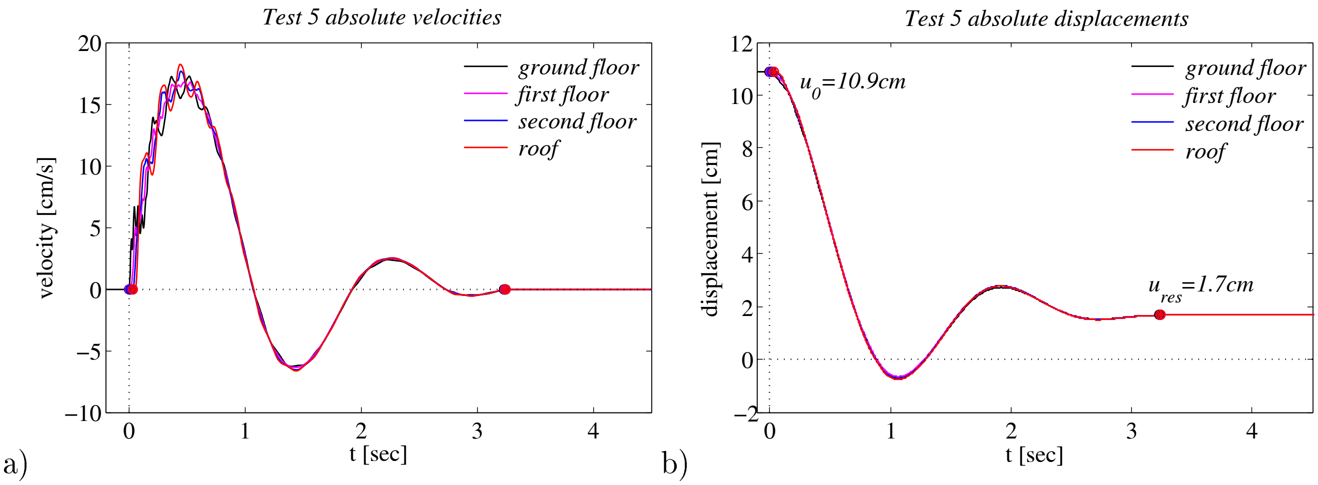


Figure A.23: Adjusted absolute velocities and displacements at the ground floor, first floor, second floor and roof of the Augusta building during test 5; sub-plots a) and b) respectively. The times when motion starts and ceases are indicated by markers. The motion starts and ends somewhat later at the upper floors.

Test 5: Relative superstructure response evaluated from the processed absolute response

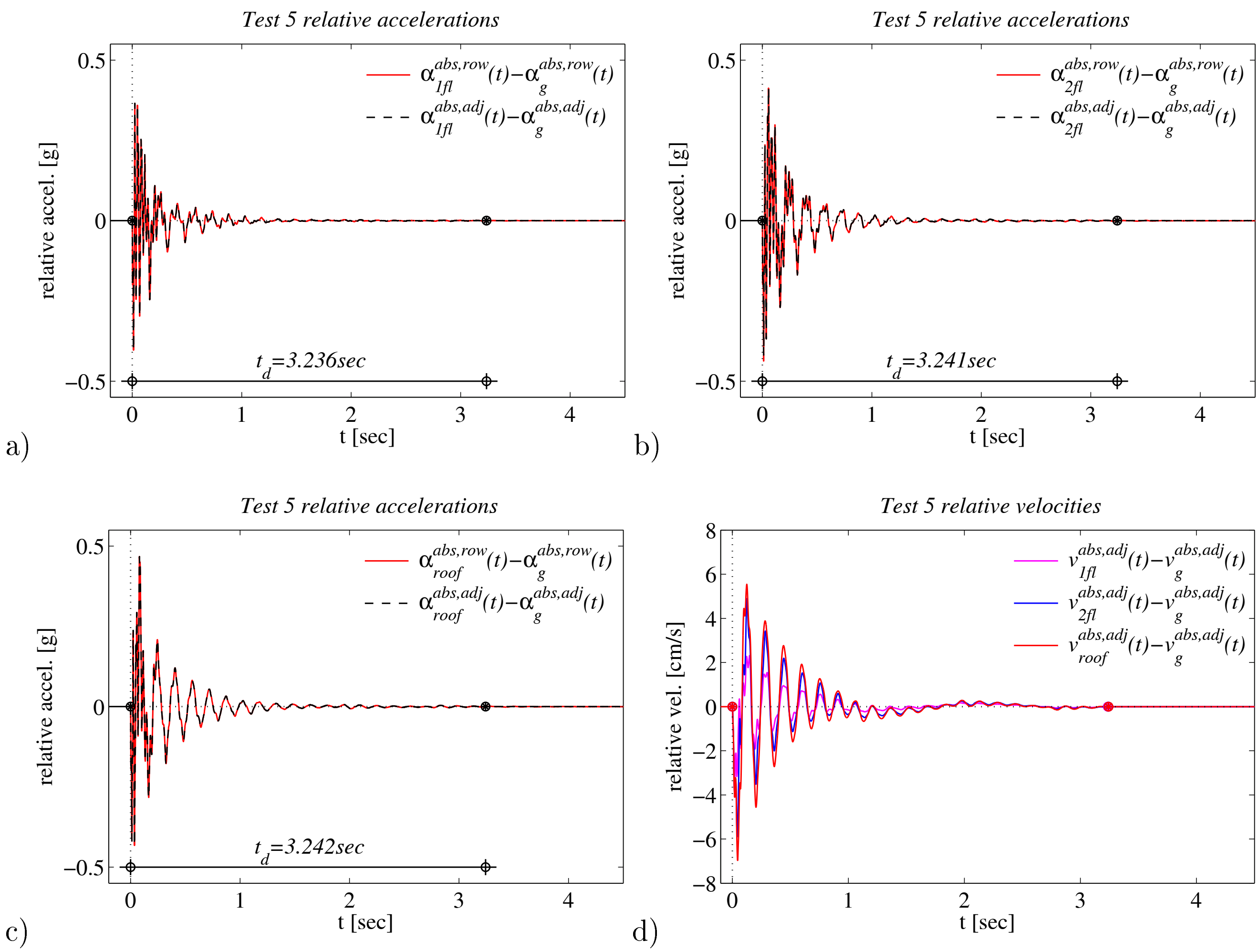


Figure A.24: Relative acceleration response at the Augusta superstructure under test 5 at first floor, second floor and roof; sub-plots a), b), c) respectively. The row signals are represented by red lines while the baseline fitted signals are shown by black lines. Sub-plot d) shows the relative floor velocities. The times when motion starts and ceases are indicated by markers. *('abs': absolute response, 'row': unprocessed response, 'adj': adjusted response, '1fl, 2fl, roof': first floor, second floor and roof response)*

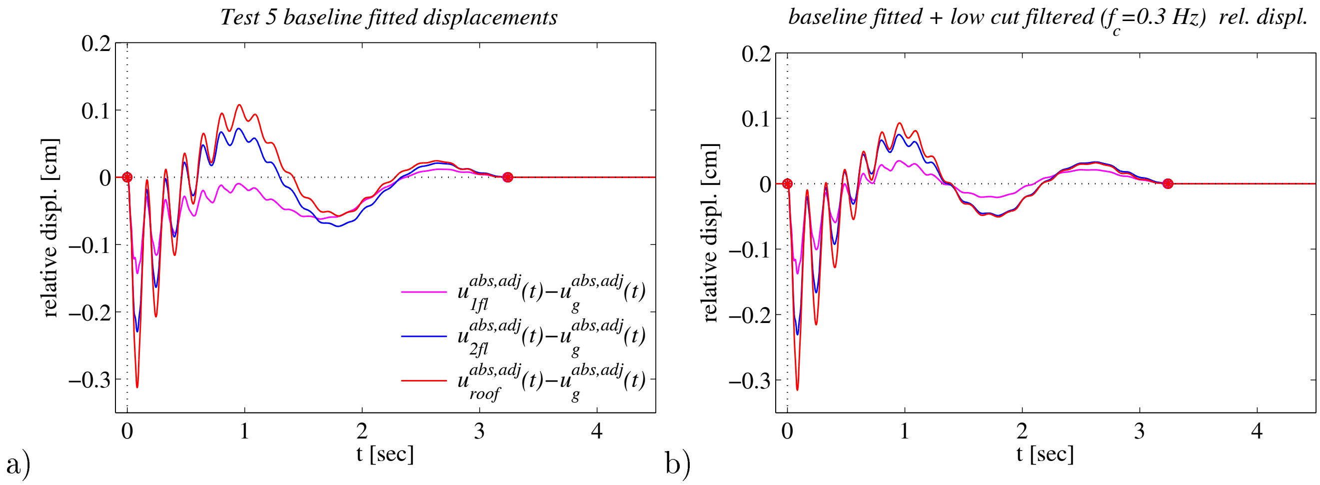


Figure A.25: Relative displacements at the Augusta superstructure during test 5; sub-plot a). Sub-plot b) shows the relative floor displacements of sub-plot a) after application of a low cut filter with corner frequency equal to $f_c = 0.30Hz$. The times when motion starts and ceases are indicated by markers. *('abs': absolute response, 'row': unprocessed response, 'adj': adjusted response, '1fl, 2fl, roof': first floor, second floor and roof response)*

Test 5: Relative superstructure response evaluated from the baseline fitting of the row relative motion

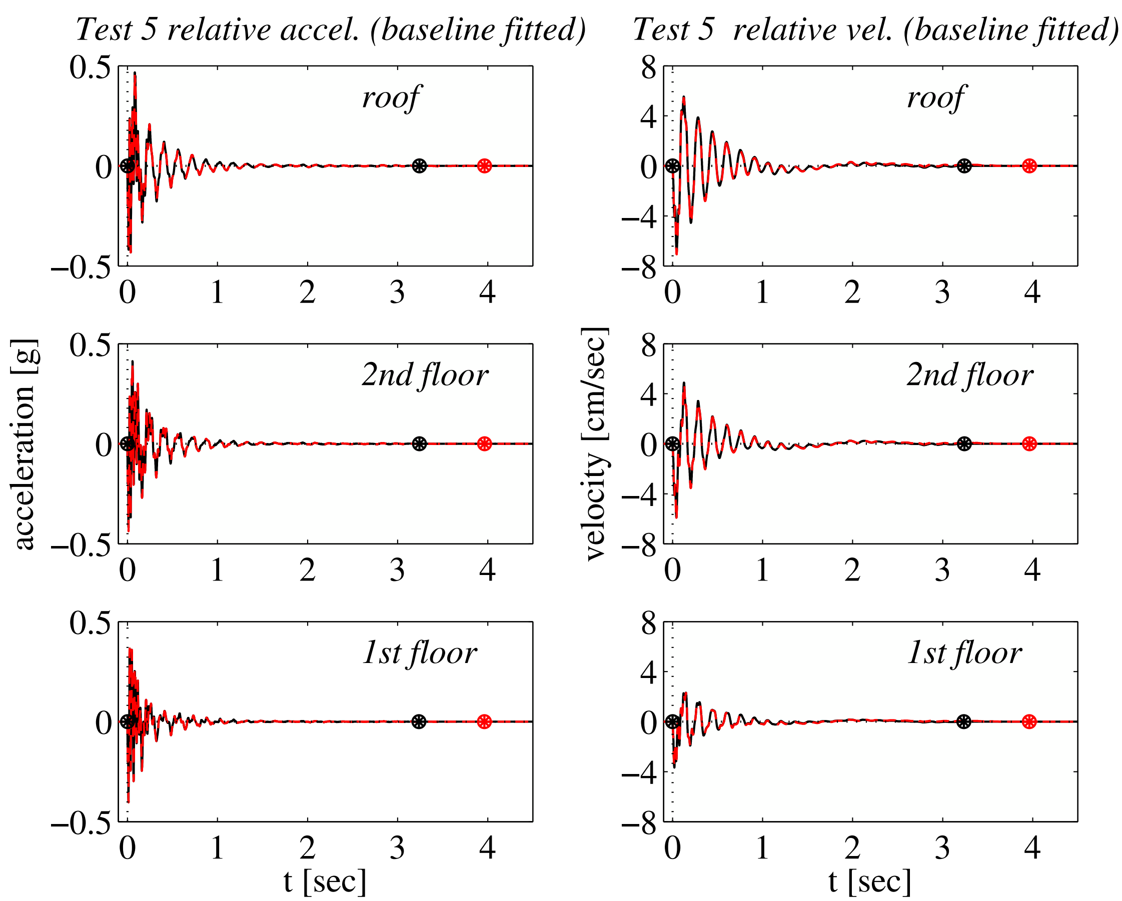


Figure A.26: Relative floor accelerations and velocities for the Augusta free vibration test 5, as evaluated from the adjusted absolute response (continuous black lines) and the adjusted relative response (dashed red lines); left sub-plots and right sub-plots respectively. The relative response is zero at the beginning and end of motion, since the superstructure is expected to respond in the linear range under such a small excitation. The times when motion starts and ceases are indicated by markers.

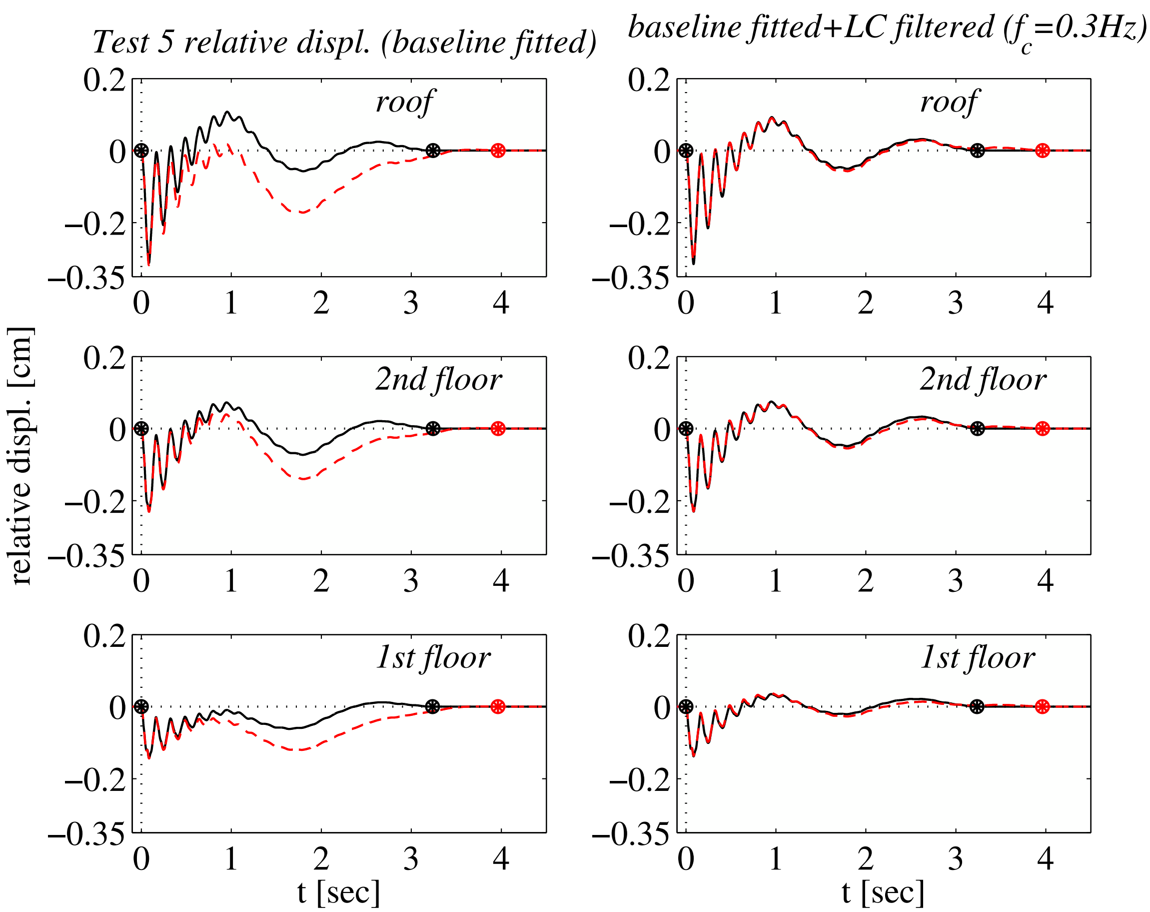


Figure A.27: Relative floor displacement histories for the Augusta free vibration test 5, as evaluated from the adjusted absolute response (continuous black lines) and the adjusted relative response (dashed red lines); left sub-plots. The relative displacements are zero at the beginning and end of motion, since the superstructure is expected to respond in the linear range under such a small excitation. The right sub-plots represent the same displacements after implementation of a low cut filter with corner frequency $f_c = 0.30Hz$. After filtering the relative displacement responses obtained by the two procedures become essentially the same. The times when motion starts and ceases are indicated by markers.

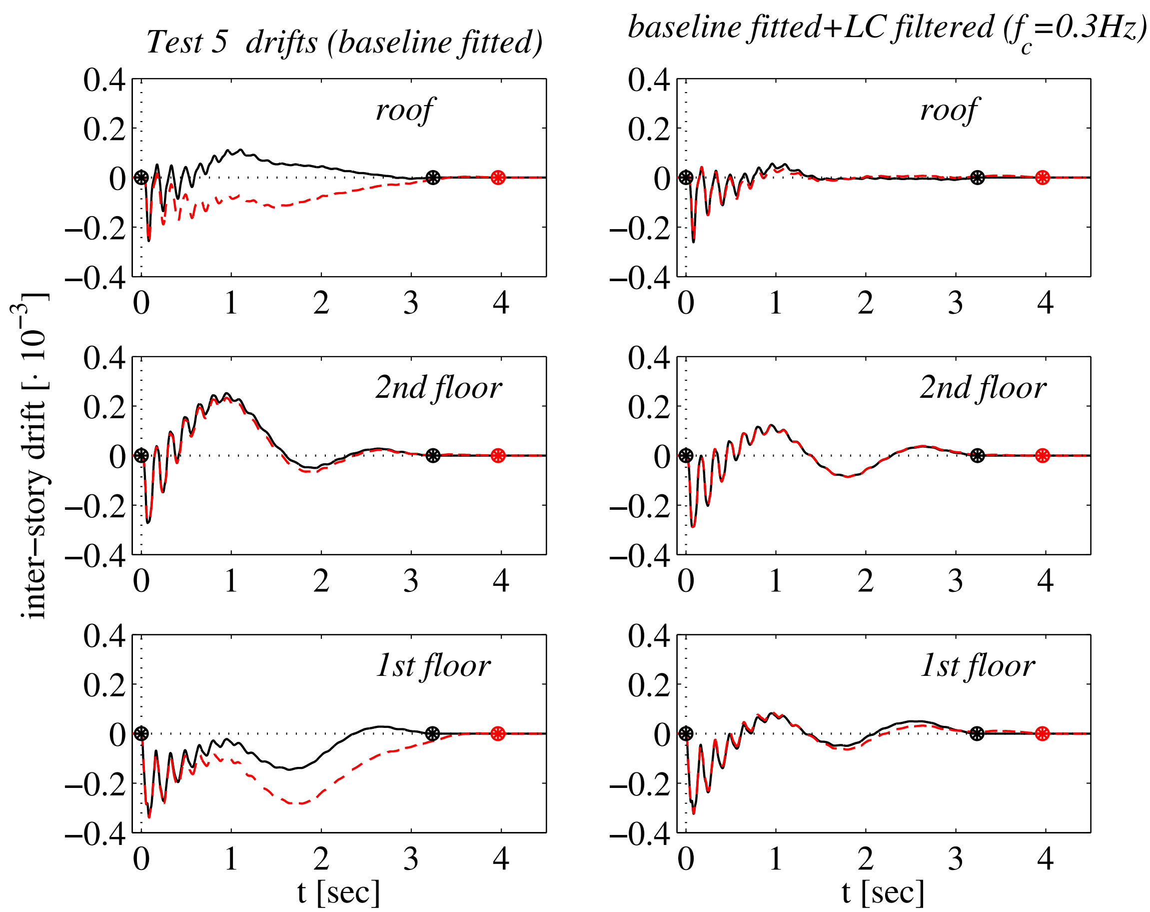


Figure A.28: Inter-story drift histories for the Augusta free vibration test 5, as evaluated from the adjusted absolute response (continuous black lines) and the adjusted relative response (dashed red lines); left sub-plots. The drifts are zero at the beginning and end of motion, since the superstructure is expected to respond in the linear range under such a small excitation. The right sub-plots represent the drifts evaluated from the corresponding filtered displacements. After filtering, the drifts obtained by the two procedures become essentially the same. The times when motion starts and ceases are indicated by markers.

A.8 Test 6-graphs

Baseline fitted absolute free vibration response

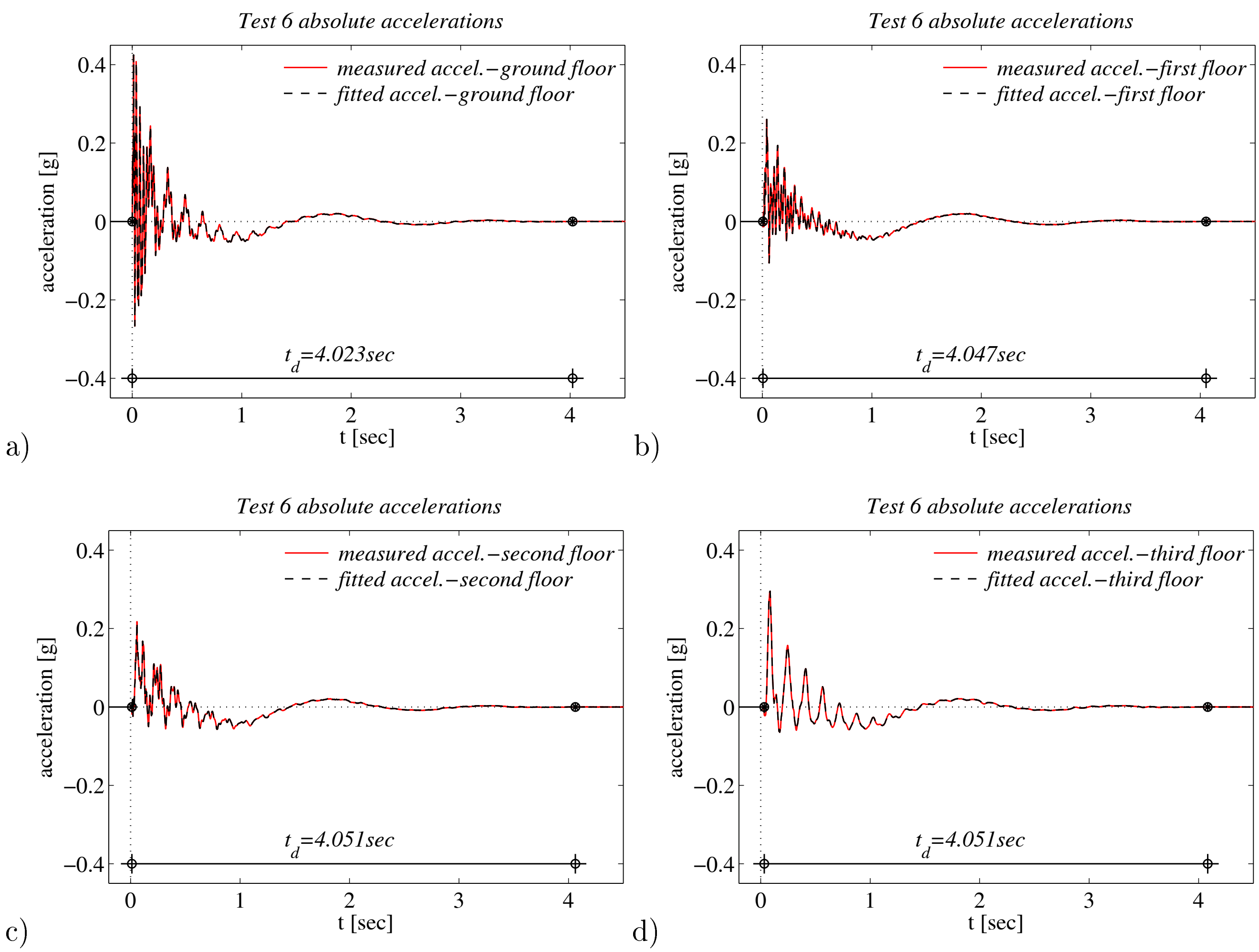


Figure A.29: Absolute acceleration response of the Augusta building during test 6: ground floor, first floor, second floor and roof response; sub-plots a), b), c), d) respectively. The row signals are represented by red lines while the baseline fitted signals are shown by black lines. The times when motion starts and ceases are indicated by black markers. The duration of strong motion is given.

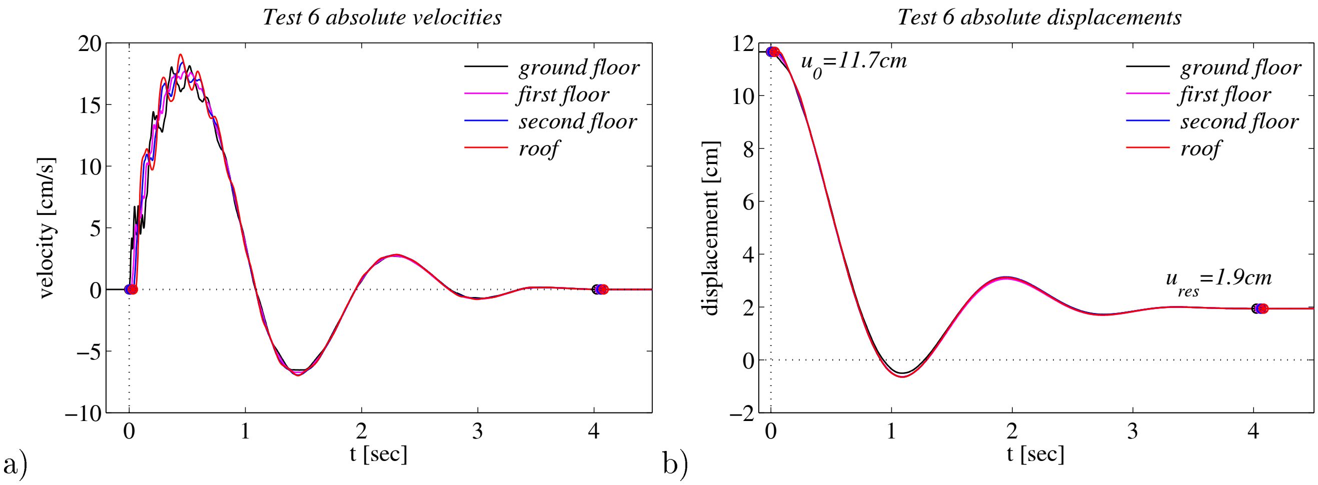


Figure A.30: Adjusted absolute velocities and displacements at the ground floor, first floor, second floor and roof of the Augusta building during test 6; sub-plots a) and b) respectively. The times when motion starts and ceases are indicated by markers. The motion starts and ends somewhat later at the upper floors.

Test 6: Relative superstructure response evaluated from the processed absolute response

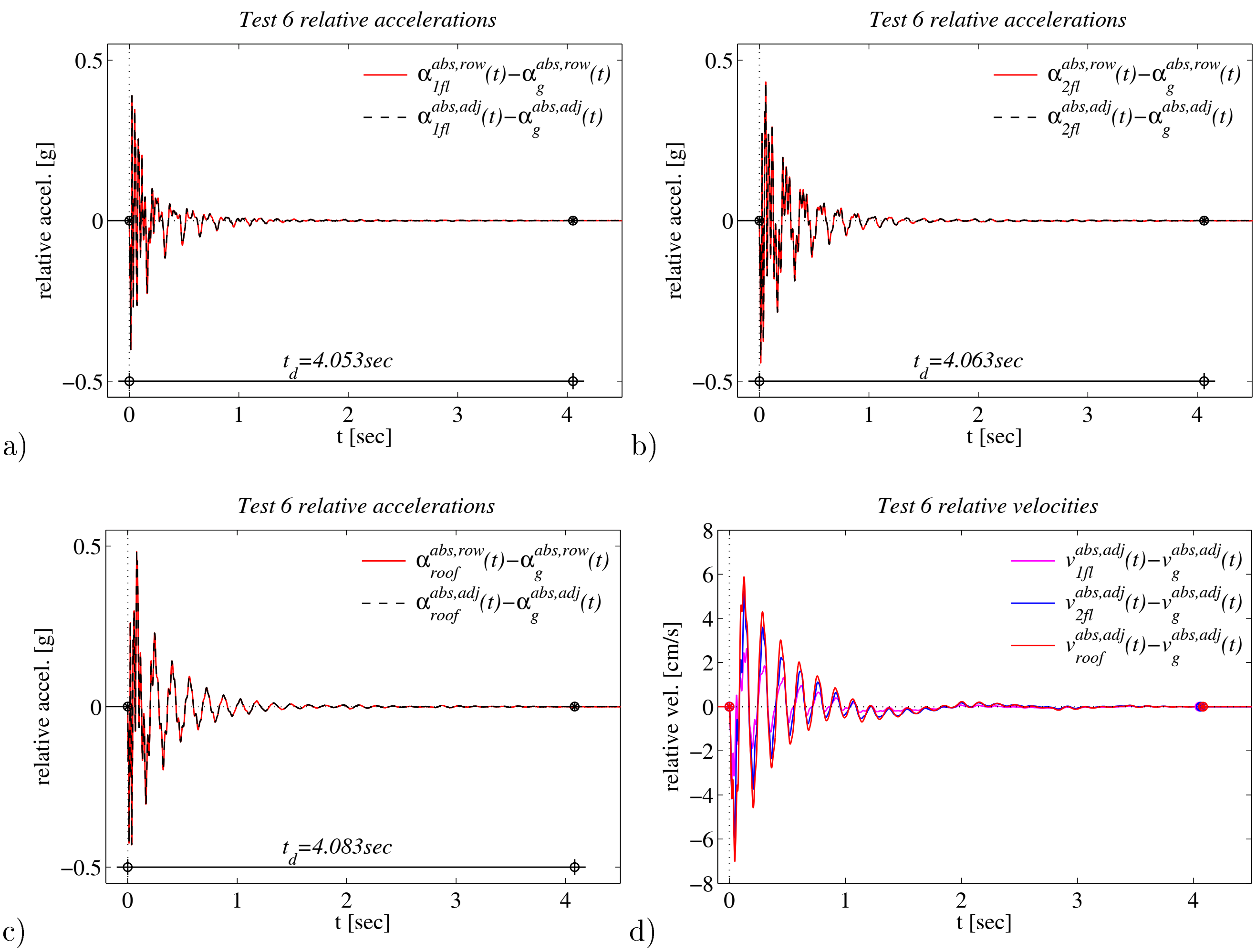


Figure A.31: Relative acceleration response at the Augusta superstructure under test 6 at first floor, second floor and roof; sub-plots a), b), c) respectively. The row signals are represented by red lines while the baseline fitted signals are shown by black lines. Sub-plot d) shows the relative floor velocities. The times when motion starts and ceases are indicated by markers. *('abs': absolute response, 'row': unprocessed response, 'adj': adjusted response, '1fl, 2fl, roof': first floor, second floor and roof response)*

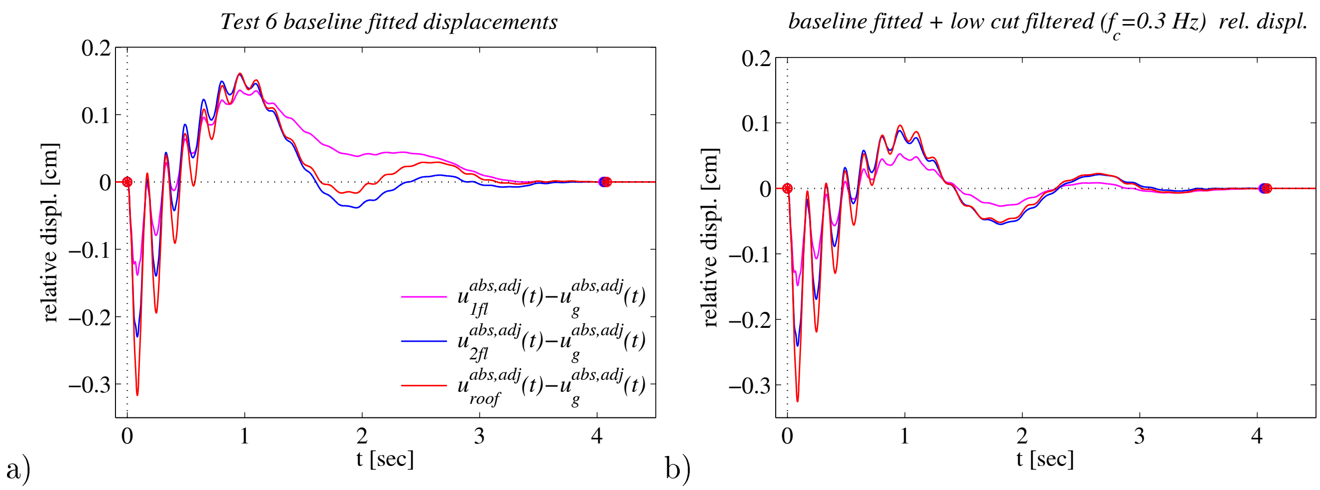


Figure A.32: Relative displacements at the Augusta superstructure during test 6; sub-plot a). Sub-plot b) shows the relative floor displacements of sub-plot a) after application of a low cut filter with corner frequency equal to $f_c = 0.30Hz$. The times when motion starts and ceases are indicated by markers. *('abs': absolute response, 'row': unprocessed response, 'adj': adjusted response, '1fl, 2fl, roof': first floor, second floor and roof response)*

Test 6: Relative superstructure response evaluated from the baseline fitting of the row relative motion

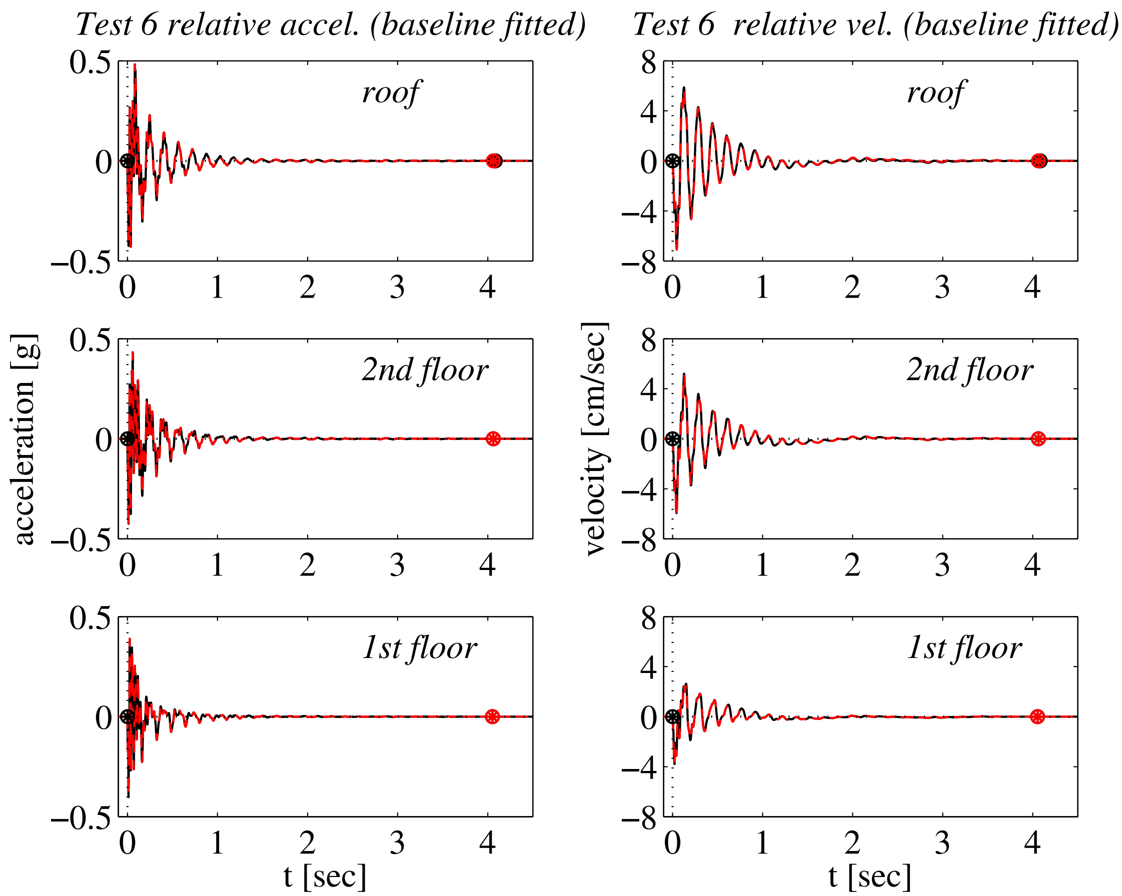


Figure A.33: Relative floor accelerations and velocities for the Augusta free vibration test 6, as evaluated from the adjusted absolute response (continuous black lines) and the adjusted relative response (dashed red lines); left sub-plots and right sub-plots respectively. The relative response is zero at the beginning and end of motion, since the superstructure is expected to respond in the linear range under such a small excitation. The times when motion starts and ceases are indicated by markers.

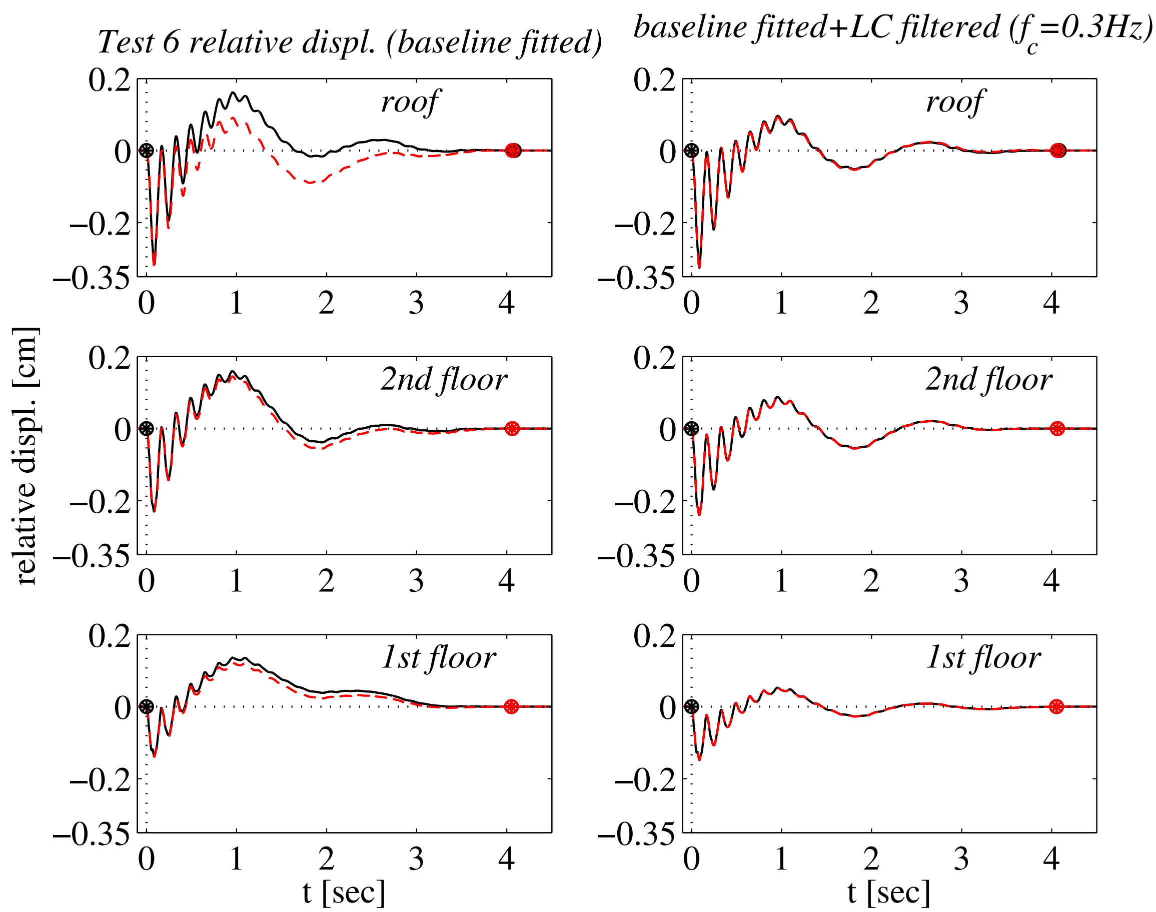


Figure A.34: Relative floor displacement histories for the Augusta free vibration test 6, as evaluated from the adjusted absolute response (continuous black lines) and the adjusted relative response (dashed red lines); left sub-plots. The relative displacements are zero at the beginning and end of motion, since the superstructure is expected to respond in the linear range under such a small excitation. The right sub-plots represent the drifts evaluated from the corresponding filtered displacements. After filtering the drifts obtained by the two procedures become essentially the same. The times when motion starts and ceases are indicated by markers.

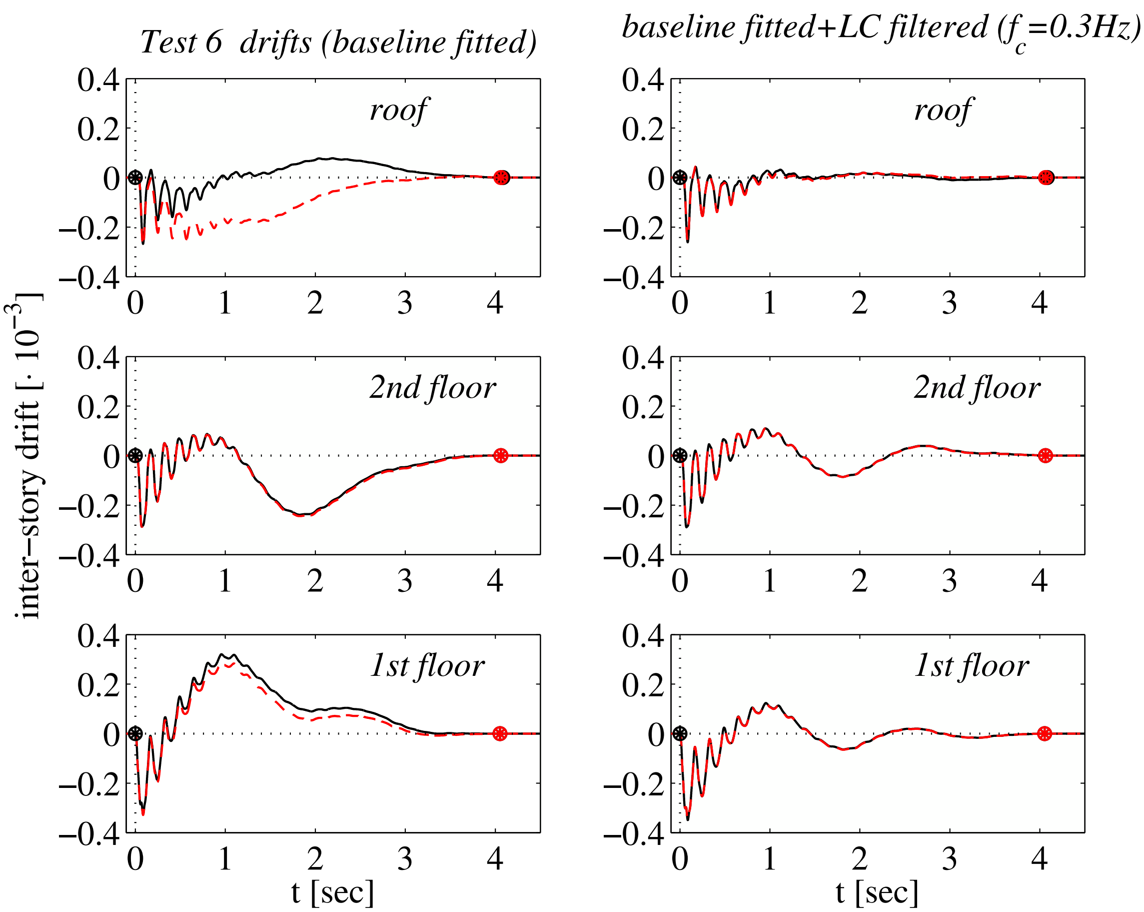


Figure A.35: Inter-story drift histories for the Augusta free vibration test 6, as evaluated from the adjusted absolute response (continuous black lines) and the adjusted relative response (dashed red lines); left sub-plots. The drifts are zero at the beginning and end of motion, since the superstructure is expected to respond in the linear range under such a small excitation. The right sub-plots represent the drifts evaluated from the corresponding filtered displacements. After filtering, the drifts obtained by the two procedures become essentially the same. The times when motion starts and ceases are indicated by markers.

A.9 TEST 8-graphs

Baseline fitted absolute free vibration response

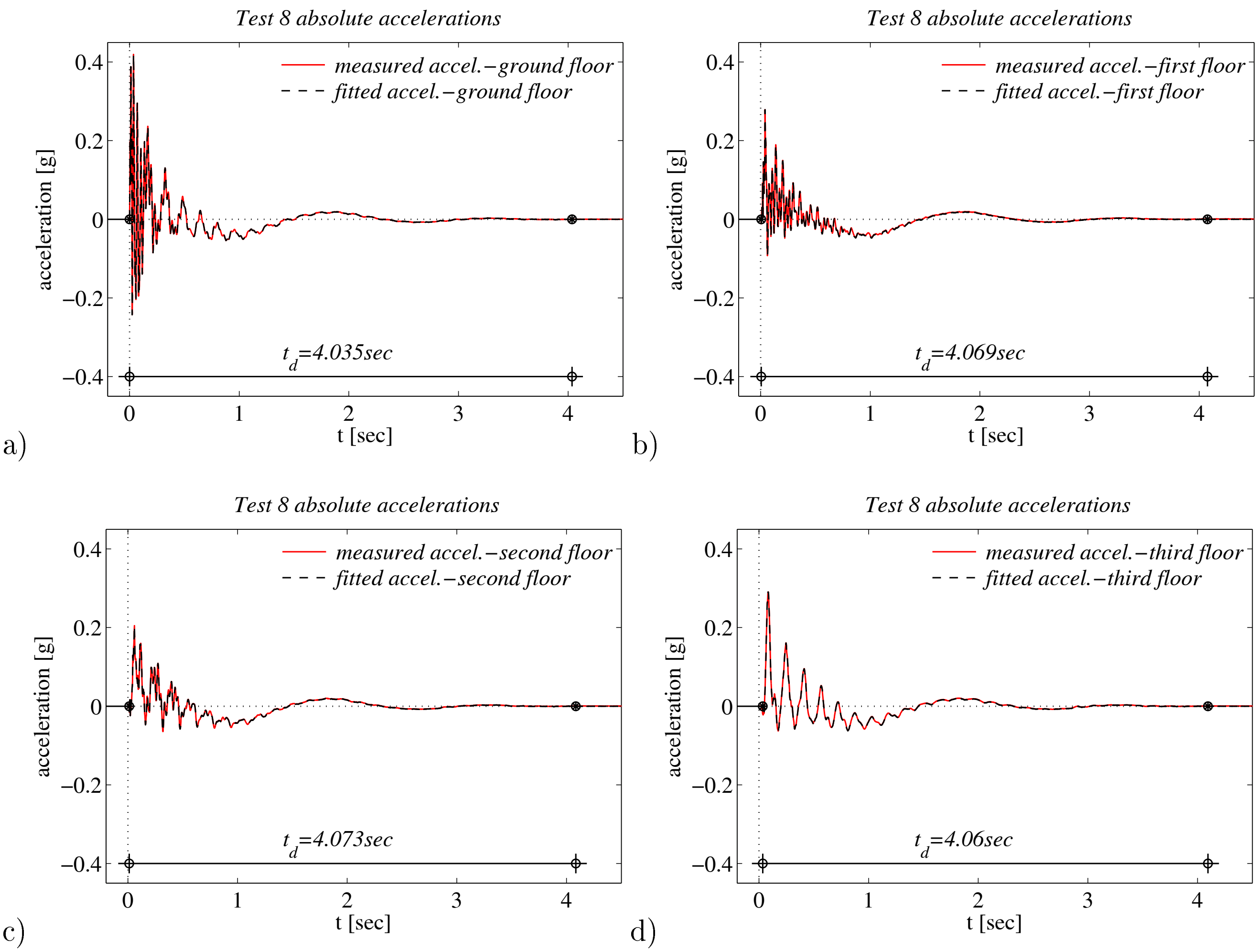


Figure A.36: Absolute acceleration response of the Augusta building during test 8: ground floor, first floor, second floor and roof response; sub-plots a), b), c), d) respectively. The row signals are represented by red lines while the baseline fitted signals are shown by black lines. The times when motion starts and ceases are indicated by black markers. The duration of strong motion is given.

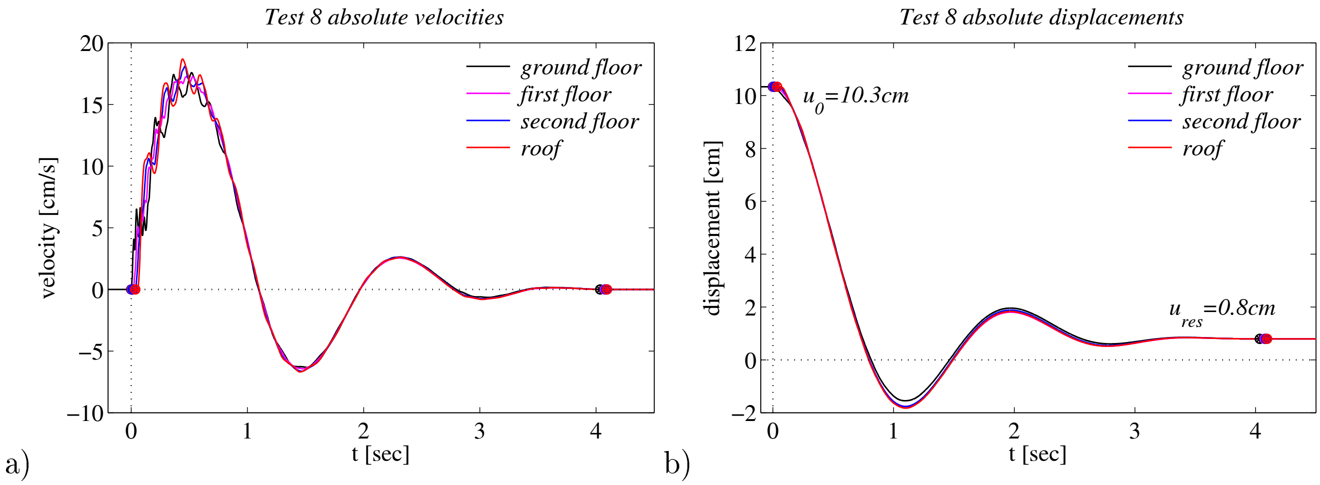


Figure A.37: Adjusted absolute velocities and displacements at the ground floor, first floor, second floor and roof of the Augusta building during test 8; sub-plots a) and b) respectively. The times when motion starts and ceases are indicated by markers. The motion starts and ends somewhat later at the upper floors.

Test 8: Relative superstructure response evaluated from the processed absolute response

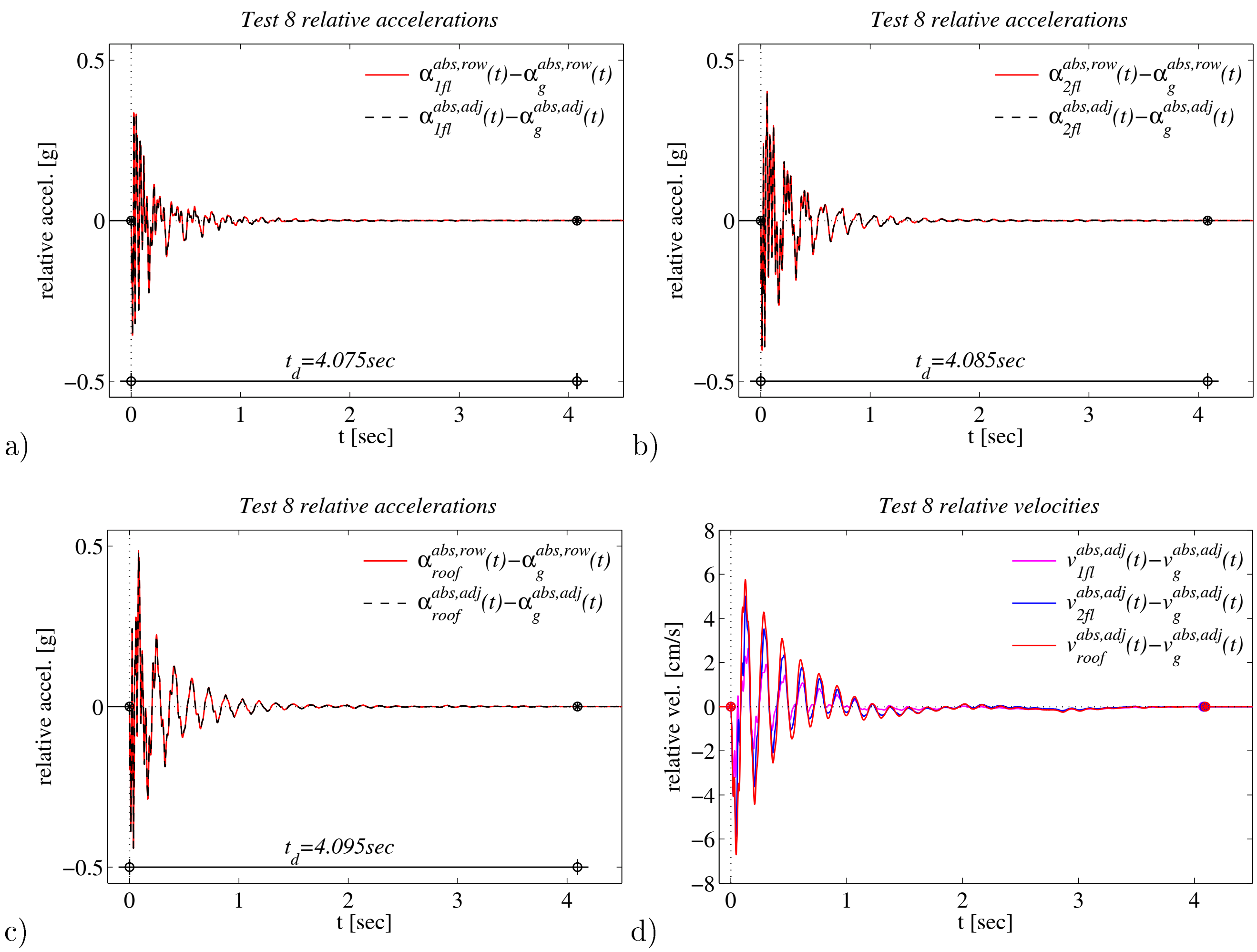


Figure A.38: Relative acceleration response at the Augusta superstructure under test 5 at first floor, second floor and roof; sub-plots a), b), c) respectively. The row signals are represented by red lines while the baseline fitted signals are shown by black lines. Sub-plot d) shows the relative floor velocities. The times when motion starts and ceases are indicated by markers. *('abs': absolute response, 'row': unprocessed response, 'adj': adjusted response, '1fl, 2fl, roof': first floor, second floor and roof response)*

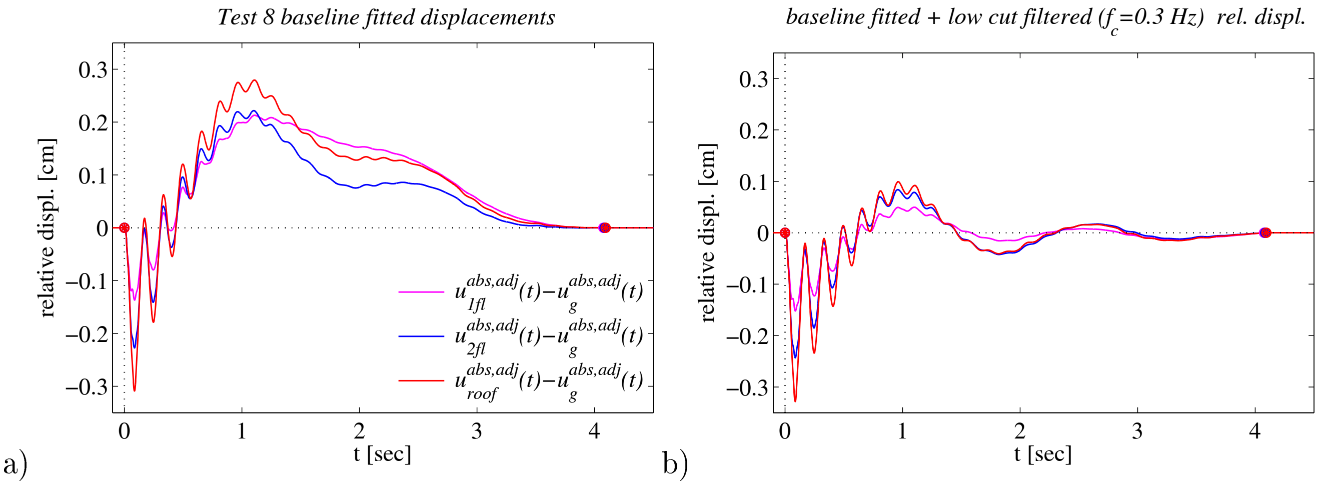


Figure A.39: Relative displacements at the Augusta superstructure during test 8; sub-plot a). Sub-plot b) shows the relative floor displacements of sub-plot a) after application of a low cut filter with corner frequency equal to $f_c = 0.30Hz$. The times when motion starts and ceases are indicated by markers. *('abs': absolute response, 'row': unprocessed response, 'adj': adjusted response, '1fl, 2fl, roof': first floor, second floor and roof response)*

Test 8: Relative superstructure response evaluated from the baseline fitting of the row relative motion

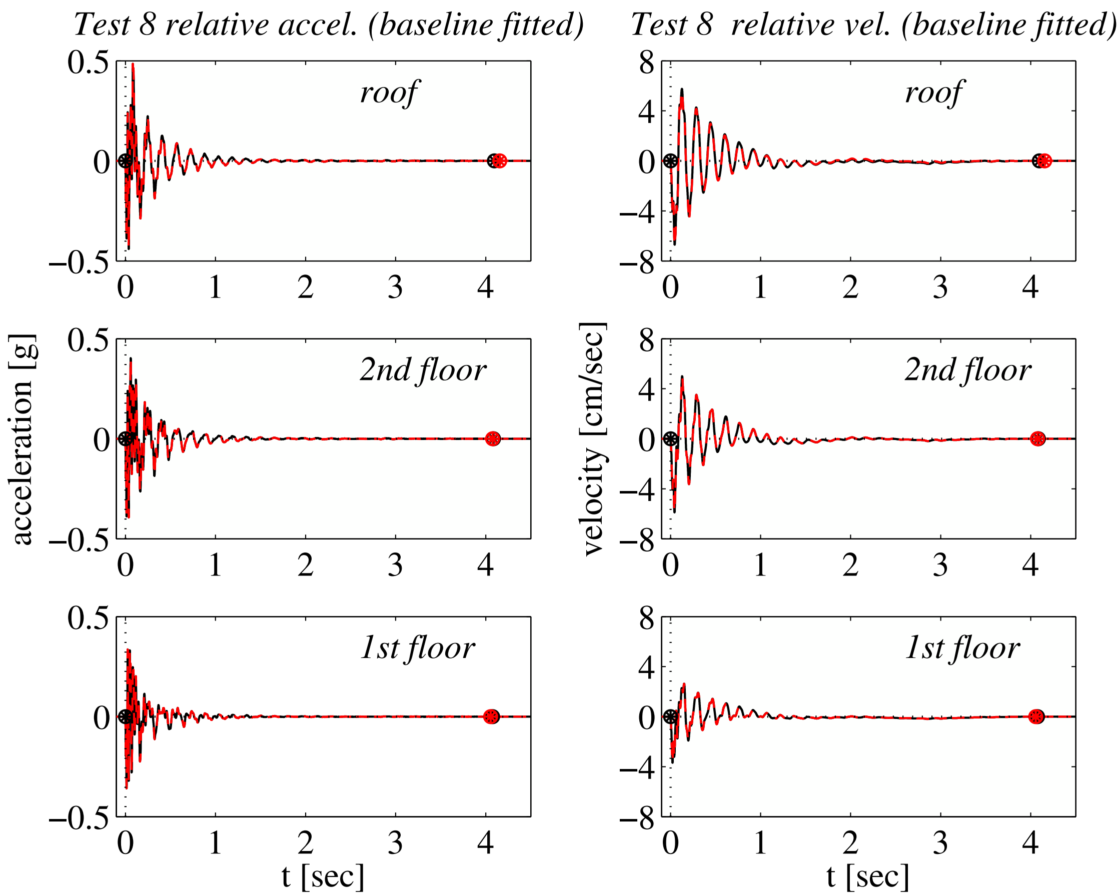


Figure A.40: Relative floor accelerations and velocities for the Augusta free vibration test 8, as evaluated from the adjusted absolute response (continuous black lines) and the adjusted relative response (dashed red lines); left sub-plots and right sub-plots respectively. The relative response is zero at the beginning and end of motion, since the superstructure is expected to respond in the linear range under such a small excitation. The times when motion starts and ceases are indicated by markers.

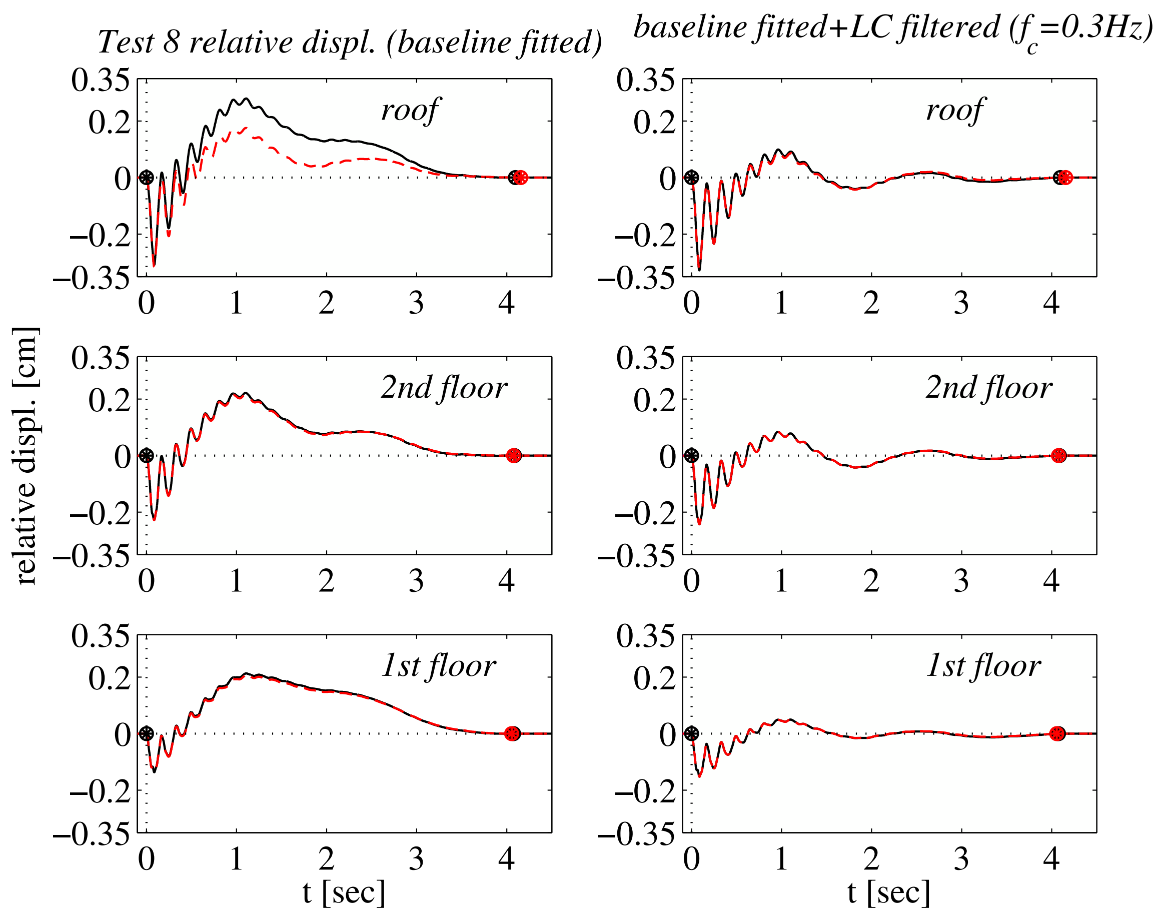


Figure A.41: Relative floor displacement histories for the Augusta free vibration test 8, as evaluated from the adjusted absolute response (continuous black lines) and the adjusted relative response (dashed red lines); left sub-plots. The relative displacements are zero at the beginning and end of motion, since the superstructure is expected to respond in the linear range under such a small excitation. The right sub-plots represent the same displacements after implementation of a low cut filter with corner frequency $f_c = 0.30Hz$. After filtering, the relative displacement responses obtained by the two procedures become essentially the same. The times when motion starts and ceases are indicated by markers.

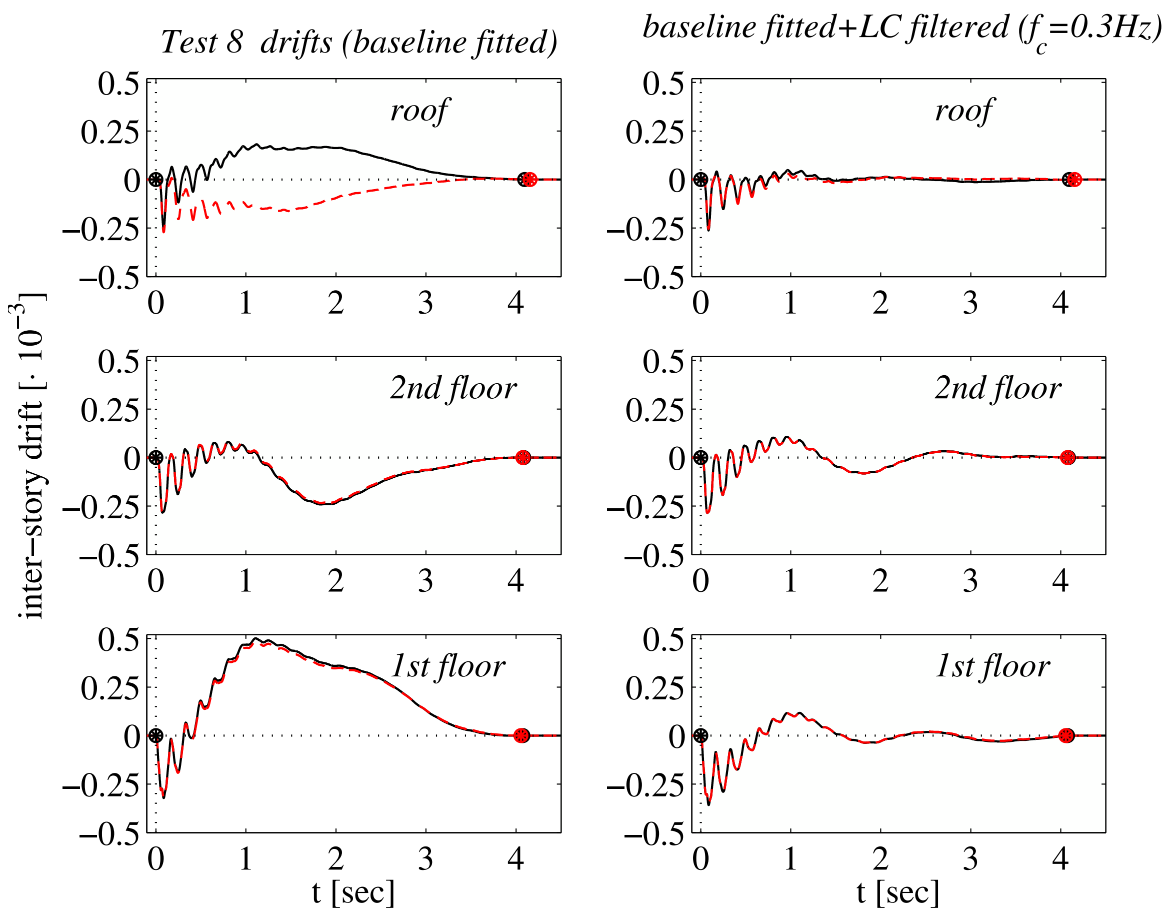


Figure A.42: Inter-story drift histories for the Augusta free vibration test 8, as evaluated from the adjusted absolute response (continuous black lines) and the adjusted relative response (dashed red lines); left sub-plots. The drifts are zero at the beginning and end of motion, since the superstructure is expected to respond in the linear range under such a small excitation. The right sub-plots represent the drifts evaluated from the corresponding filtered displacements. After filtering, the drifts obtained by the two procedures become essentially the same. The times when motion starts and ceases are indicated by markers.

A.10 TEST 10-graphs

Baseline fitted absolute free vibration response

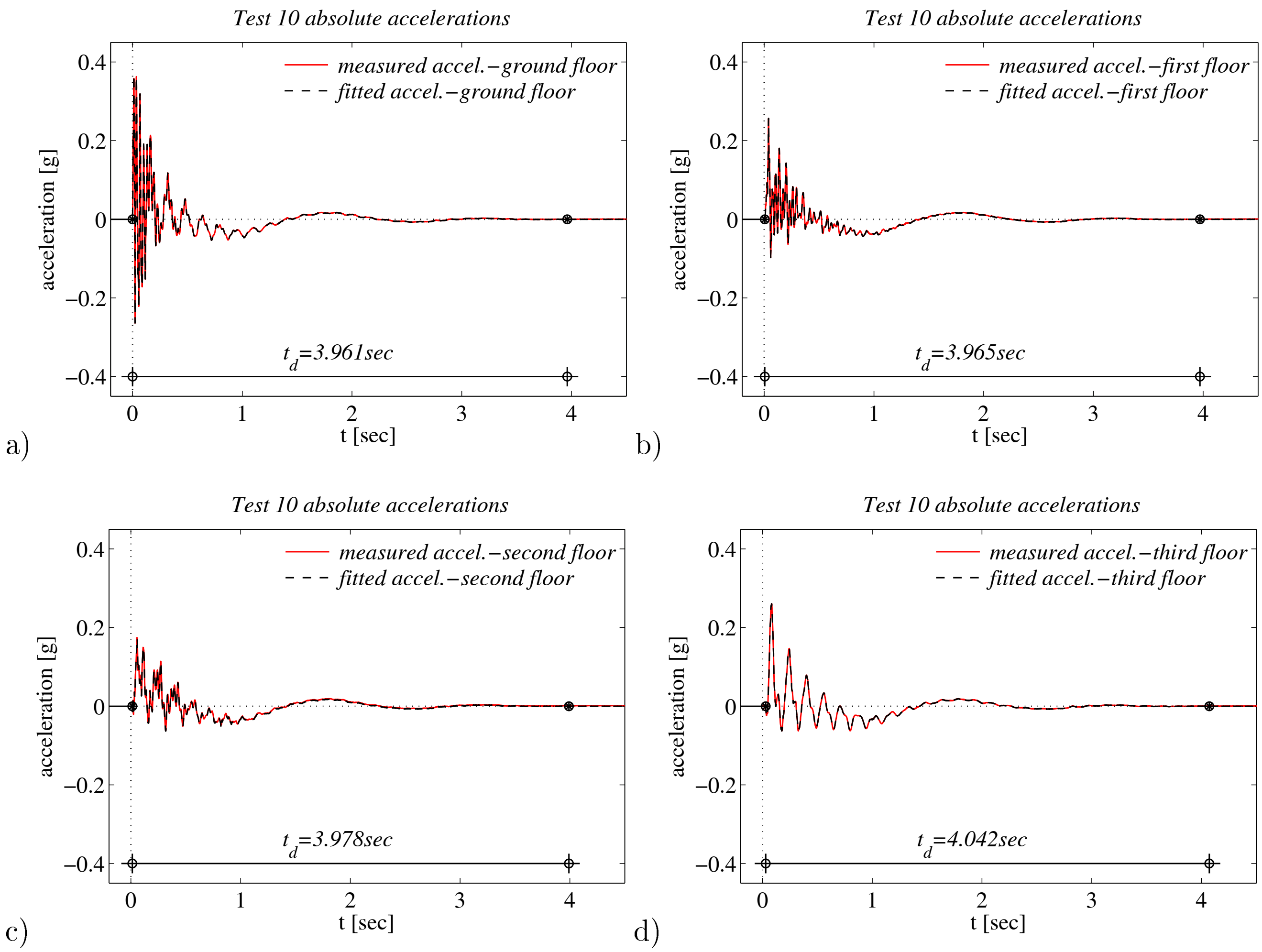


Figure A.43: Absolute acceleration response of the Augusta building during test 10: ground floor, first floor, second floor and roof response; sub-plots a), b), c), d) respectively. The row signals are represented by red lines while the baseline fitted signals are shown by black lines. The times when motion starts and ceases are indicated by black markers. The duration of strong motion is given.

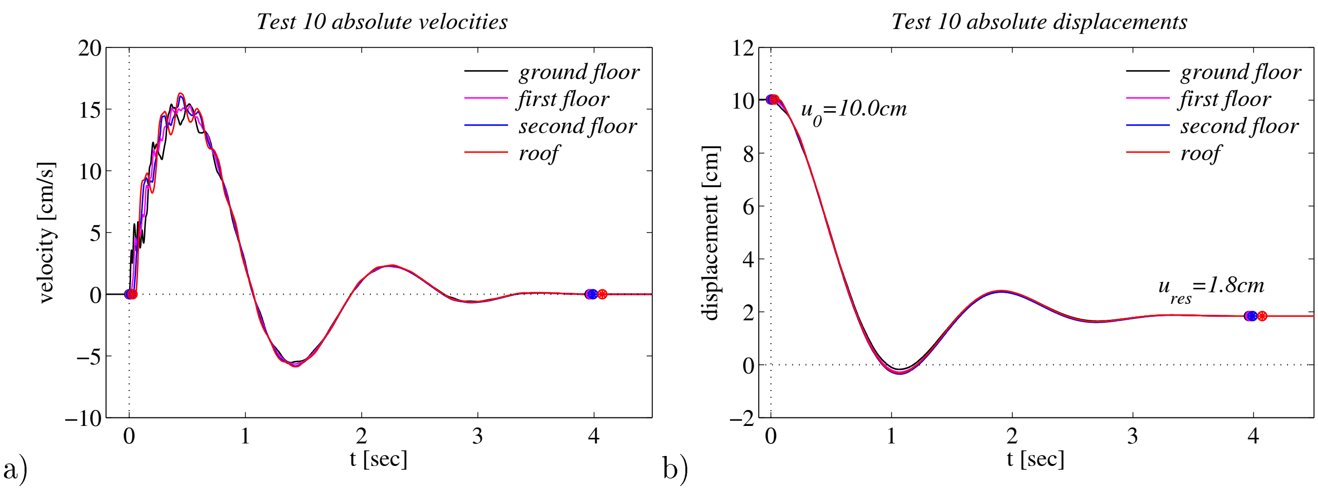


Figure A.44: Adjusted absolute velocities and displacements at the ground floor, first floor, second floor and roof of the Augusta building during test 10; sub-plots a) and b) respectively. The times when motion starts and ceases are indicated by markers. The motion starts and ends somewhat later at the upper floors.

Test 10: Relative superstructure response evaluated from the processed absolute response

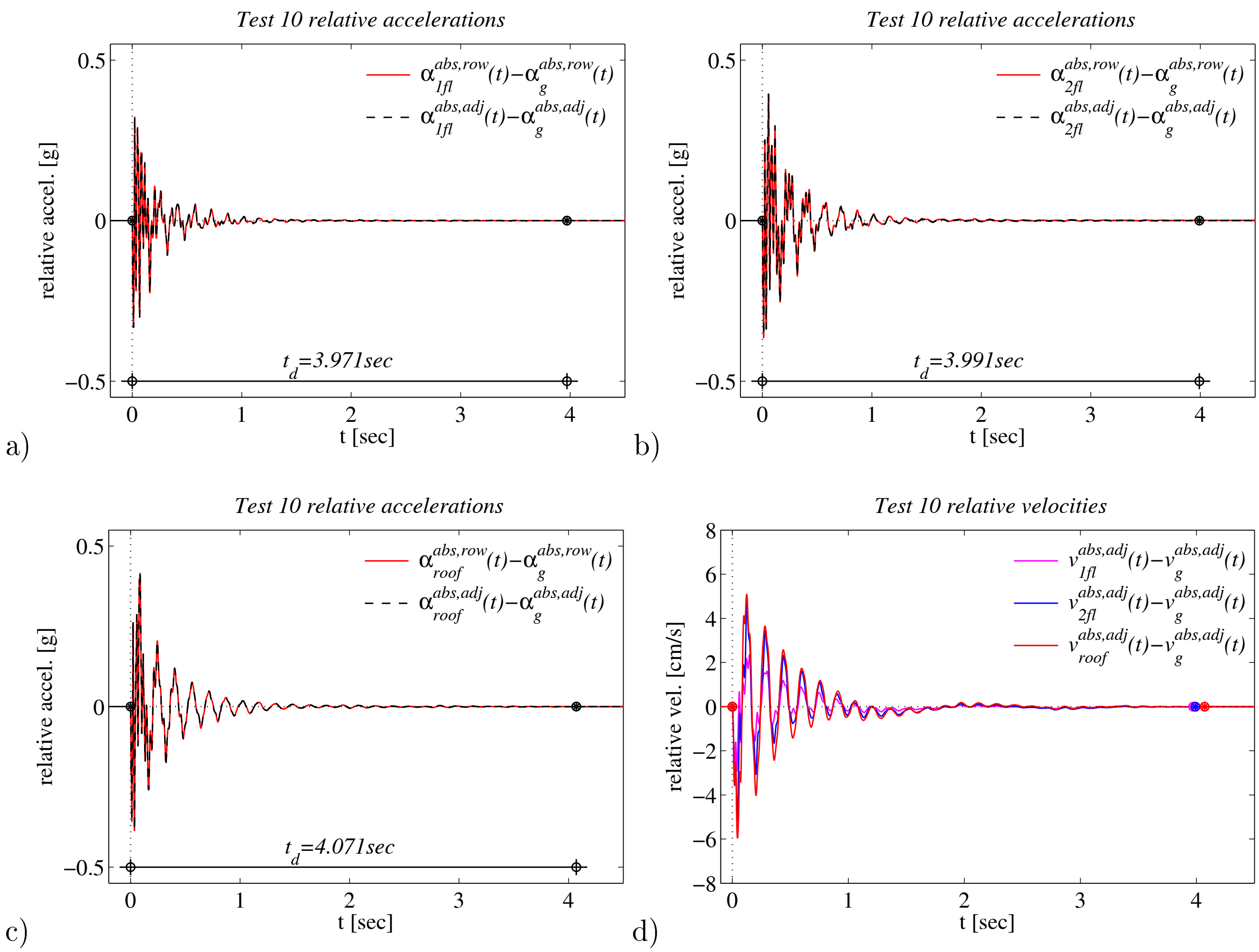
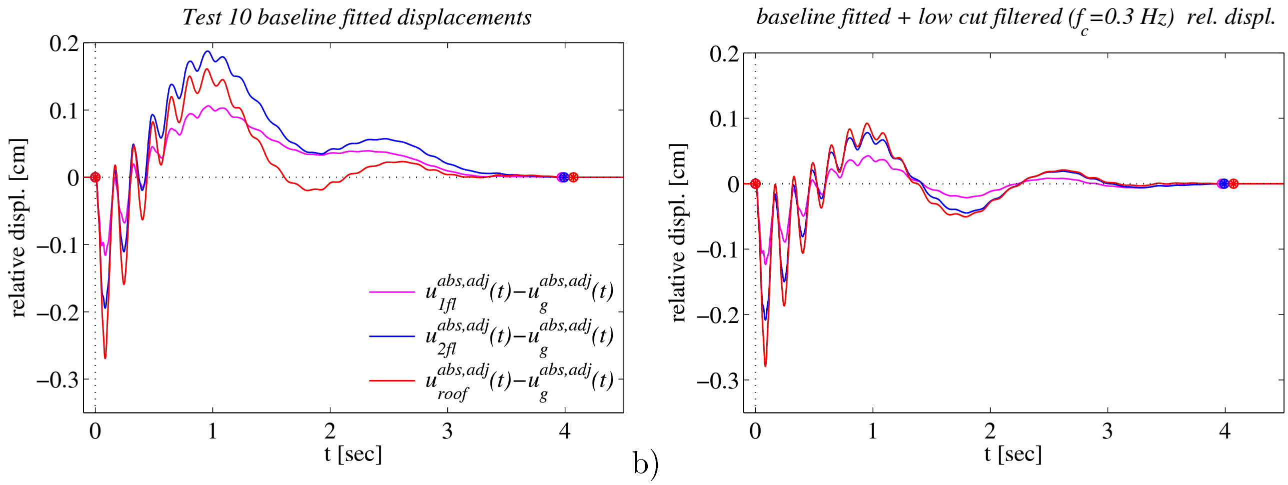


Figure A.45: Relative acceleration response at the Augusta superstructure under test 10 at first floor, second floor and roof; sub-plots a), b), c) respectively. The row signals are represented by red lines while the baseline fitted signals are shown by black lines. Sub-plot d) shows the relative floor velocities. The times when motion starts and ceases are indicated by markers. *('abs': absolute response, 'row': unprocessed response, 'adj': adjusted response, '1fl, 2fl, roof': first floor, second floor and roof response)*



a) b)

Figure A.46: Relative displacements at the Augusta superstructure during test 10; sub-plot a). Sub-plot b) shows the relative floor displacements of sub-plot a) after application of a low cut filter with corner frequency equal to $f_c = 0.30Hz$. The times when motion starts and ceases are indicated by markers. *('abs': absolute response, 'row': unprocessed response, 'adj': adjusted response, '1fl, 2fl, roof': first floor, second floor and roof response)*

Test 10: Relative superstructure response evaluated from the baseline fitting of the row relative motion

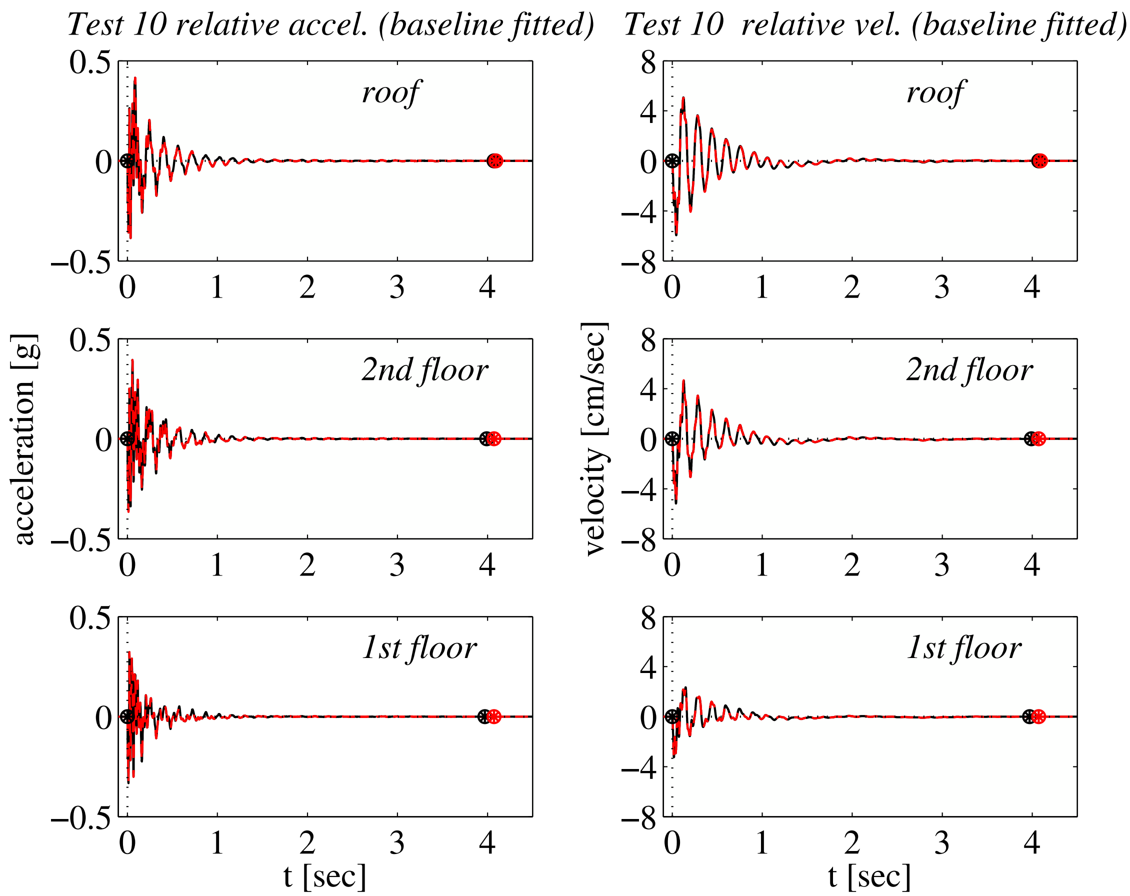


Figure A.47: Relative floor accelerations and velocities for the Augusta free vibration test 10, as evaluated from the adjusted absolute response (continuous black lines) and the adjusted relative response (dashed red lines); left sub-plots and right sub-plots respectively. The relative response is zero at the beginning and end of motion, since the superstructure is expected to respond in the linear range under such a small excitation. The times when motion starts and ceases are indicated by markers.

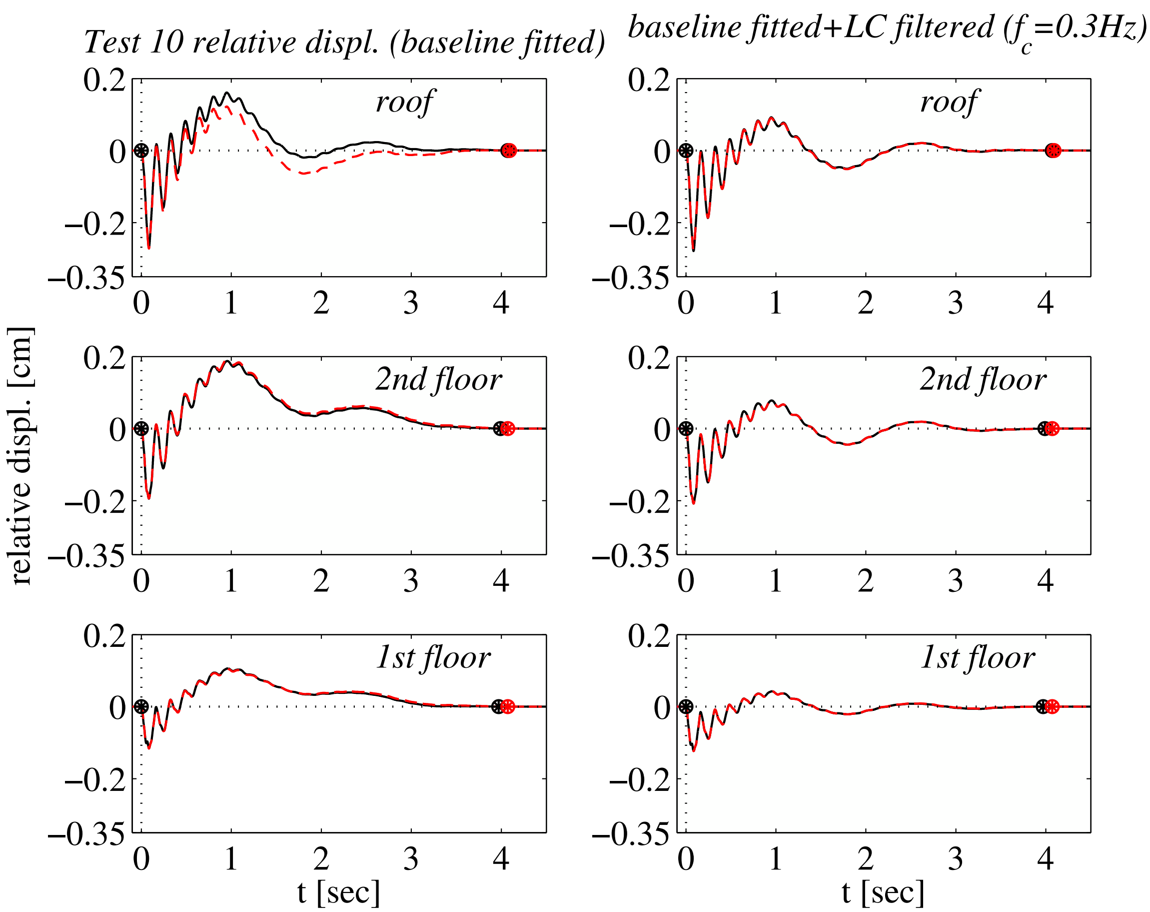


Figure A.48: Relative floor displacement histories for the Augusta free vibration test 10, as evaluated from the adjusted absolute response (continuous black lines) and the adjusted relative response (dashed red lines); left sub-plots. The relative displacements are zero at the beginning and end of motion, since the superstructure is expected to respond in the linear range under such a small excitation. The right sub-plots represent the same displacements after implementation of a low cut filter with corner frequency $f_c = 0.30Hz$. After filtering the relative displacement responses obtained by the two procedures become essentially the same. The times when motion starts and ceases are indicated by markers.

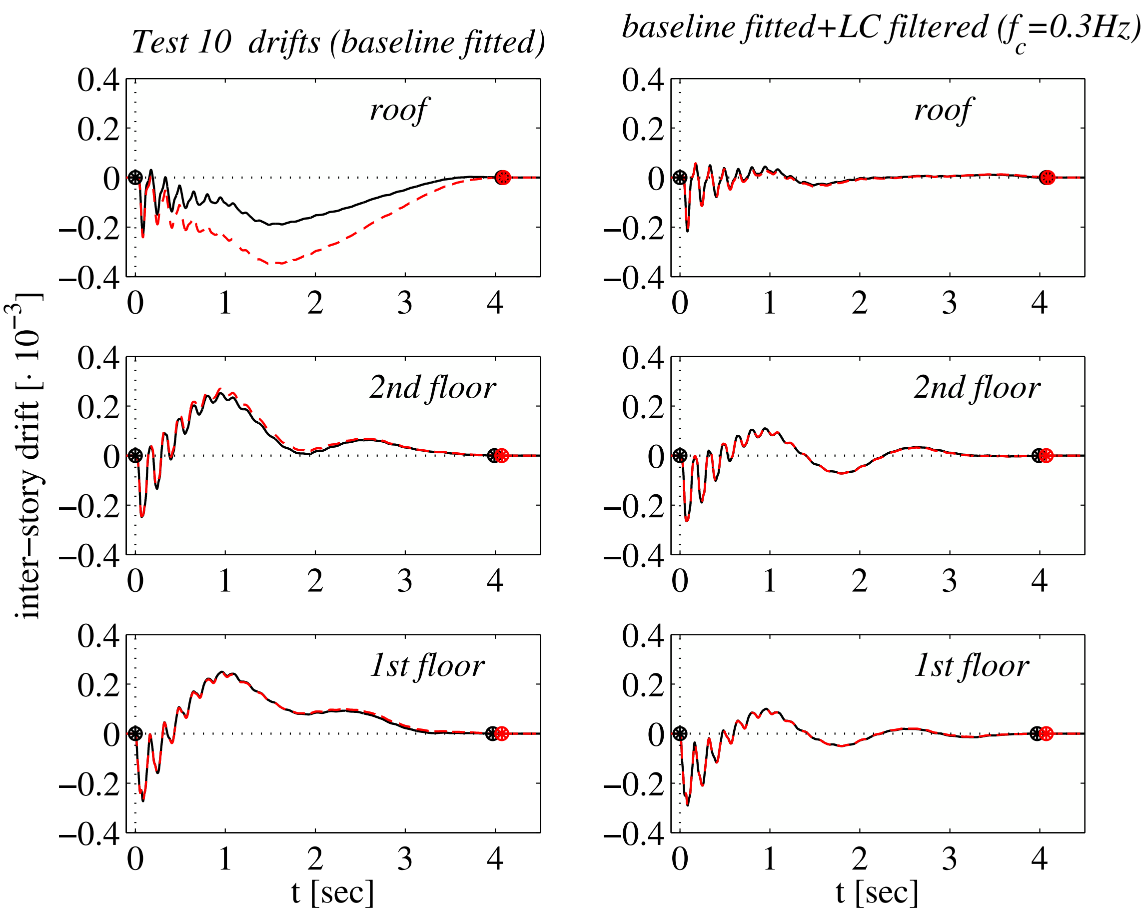


Figure A.49: Inter-story drift histories for the Augusta free vibration test 10, as evaluated from the adjusted absolute response (continuous black lines) and the adjusted relative response (dashed red lines); left sub-plots. The drifts are zero at the beginning and end of motion, since the superstructure is expected to respond in the linear range under such a small excitation. The right sub-plots represent the drifts evaluated from the corresponding filtered displacements. After filtering, the drifts obtained by the two procedures become essentially the same. The times when motion starts and ceases are indicated by markers.