A Description of the Enclosed CD

The enclosed CD is organized with following folders and sub-folders:

- *Thesis,* *.pdf version of the thesis. This is in several files: Front, Quote, Thesis and Appendixes.
- *Figures* (subfolder for each chapter), containing all figures made by the author given in this thesis.
- *GMS* (subfolder for each scenario described), containing input and output for all the scenario earthquakes and the conducted ground motion simulations.
- *Databases*, there have been compiled several databases during this thesis work, all that have been obtained from free sources are given. The databases consist of three earthquake catalogs (see section 4.5.3) and a file containing all the simulation points used in the ground motion simulations. Furthermore there is given a spreadsheet prepared in order to calculate grid points on fault planes (see section 4.5.2 and appendix C).
- *GMT_scripts*, the GMT scripts written during this study in order to produces the figures used in the thesis. For details on each script see the *readme_GMT.txt* file.
- *MatLab_scripts*, the MatLab scripts written by the author during this study, used to plot simulated results. For details on each script see the *readme_MatLab.txt* file.

B List of Symbols

$u(t)$	Seismogram, or displacement field in the time domain
$U(\omega)$	Seismogram, or displacement field in the frequency domain
$x(t)$	Earthquake source in the time domain
$X(\omega)$	Earthquake source in the frequency domain
$q(t)$	Anelastic earth structure in the time domain
$Q(\omega)$	Anelastic earth structure in the frequency domain
$i(t)$	Instrument response in the time domain
$I(\omega)$	Instrument response in the frequency domain
$s(t)$	Site effects or site response in the time domain
$S(\omega)$	Site effects or site response in the frequency domain
Δ, r	Distance from fault to station
L	Fault length
a	Earth radius
h	Hypocenter depth
ϕ	Strike
δ	Dip
λ	Rake
θ	Angle between strike of the fault and the first wave trace to the station
α	P-wave velocity
β	S-wave velocity
v	Wave velocity
V_R	Rupture velocity
ρ	Density
μ	Rigidity
ω	Frequency
ω_{max}	Maximum frequency
f_c	Corner frequency
Q	Attenuation
t	Time
T_R	Rupture time
τ	Risetime
τ_a	Asperity risetime
$\tau^{\alpha/\beta}$	Travel time for either P- or S-waves
$g(\Delta)$	Geometrical spreading
R	Radiation pattern
i_0	Angle of incidence
i_n	Take-off angle for P-wave
j_n	Take-off angle for S-wave

$\dot{M}(t)$	Seismic moment rate function
M_0	Seismic moment
M_w	Moment magnitude
$D(t)$	Slip, time dependent
$S(t)$	Fault area, time dependent
$\Delta\sigma$	Stress drop, average
$\Delta\sigma_{asp}$	Stress drop, asperity
$\Delta\sigma_{bg}$	Stress drop, background
C	Stress drop ratio
k	wavenumber

C Grid Point Calculations

As mentioned in chapter 4.3.1 and 4.5.2 there have been created a spreadsheet during this thesis work. This spreadsheet is used to calculate coordinates on the fault planes used in the ground motion simulations. The spreadsheet is built on the calculations given in the example for point calculations on fault planes, given in chapter 4.3.1. One feature it has not been possible to develop in this sheet is to include the geometry perspective of each fault to insure an automatic evaluation of each single fault. The spreadsheet can therefore not determine if the small contributions found, when moving along either strike or dip, should be added or subtracted from the original coordinates, and this has to be evaluated by the user.

The spreadsheet used for calculating coordinates used in the ground motion simulations is given in table appendix.no.1. The scale for calculating kilometres into degrees in the study area is for longitudes 87.14 km/deg and 111.2 km/deg for latitudes.

Table C.1: Copy of the spreadsheet created in Excel in order to calculate the coordinates for the points on the fault plane used in the ground motion simulations. There is given references in the left column to equations given in chapter 4.3.1. Coordinates used in the ground motion simulations for the earthquake scenarios are given in bold. If the contributions found when moving along e.g. strike of the fault is added or subtracted is discussed below the tables. The fault names refer to the earthquake scenarios described in chapter4.4.

Coordinates defining the fault	1A WIF	1B EIF	2 GF south	2 GF interm.
x1 (start longitude)	26.8799	27.1158	26.6294	26.6536
y1 (start latitude)	38.3743	38.4099	38.2888	38.3297
x2 (end longitude)	27.0845	27.3473	26.6277	26.6294
y2 (end latitude)	38.3983	38.4625	38.1089	38.2888
a: equation 4.6	0.12	0.23	105.82	1.69
v: equation 4.7	6.69	12.80	89.46	59.39
b: equation 4.12	-8.53	-4.40	-0.01	-0.59
Strike	263.31	257.20	180.54	210.61
Perpendicular to strike	173.31	167.20	270.54	300.61
Dip	60	60	80	80
Background point				
Distance a. strike, |s|	1.50	1.50	18.75	3.75
Distance a. dip, |c|	1.50	1.50	1.25	1.25
Distance horizontal a. dip, |p|	0.75	0.75	0.22	0.22
Along strike:				
dx (km): equation 4.11	1.4898	1.4627	0.1772	1.9096
dx (deg)	0.0171	0.0168	0.0020	0.0219

dy (km): equation 4.10	0.1748	0.3323	18.7492	3.2274
dy (deg)	0.0016	0.0030	0.1686	0.0290
x*=x1+dx / =x1-dx	26.8970	27.1326	26.6274	26.6317
y*=y1+dy / =y1-dy	38.3759	38.4129	38.1202	38.3007
Along dip:				
dx (km): equation 4.11	0.0874	0.1662	0.2171	0.1868
dx (deg)	0.0010	0.0019	0.0025	0.0021
dy (km): equation 4.10	0.7449	0.7314	0.0021	0.1105
dy (deg)	0.0067	0.0066	1.84E-5	0.0010
x_b=x*-dx / =x*+dx	**26.8960**	**27.1307**	**26.6249**	**26.6295**
y_b=y*+dy / =y*-dy	**38.3826**	**38.4195**	**38.1202**	**38.3017**
Depth: equation 4.13	1.2990	1.2990	1.2310	1.2310
Depth + 2 (km)	**3.2990**	**3.2990**	**3.2310**	**3.2310**
Asperity point				
Distance a. strike, |s|	6.00	6.00	8.75	
Distance a. dip, |c|	6.00	6.00	5.00	
Distance horizontal a. dip, |p|	3.00	3.00	0.87	
Along strike:				
dx (km): equation 4.11	5.9591	5.8509	0.0827	
dx (deg)	0.0684	0.0671	0.0009	
dy (km): equation 4.10	0.6990	1.3294	8.7496	
dy (deg)	0.0063	0.0120	0.0787	
x*=x1+dx	26.9483	27.1829	26.6285	
y*=y1+dy	38.3806	38.4219	38.2101	
Along dip:				
dx (km): equation 4.11	0.3495	0.6647	0.8682	
dx (deg)	0.0040	0.0076	0.0100	
dy (km): equation 4.10	2.9796	2.9254	0.0082	
dy (deg)	0.0268	0.0263	7.38E-5	
x_b=x*-dx / =x*+dx	**26.9443**	**27.1753**	**26.6185**	
y_b=y*+dy / =y*-dy	**38.4074**	**38.4482**	**38.2102**	
Depth: equation 4.13	5.1962	5.1962	4.9240	
Depth + 2 (km)	**7.1962**	**7.1962**	**6.9240**	
Hypocenter				
Distance a. strike, |s|	4.50	4.50	10.00	
Distance a. dip, |c|	10.50	10.50	11.25	
Distance horizontal a. dip, |p|	5.25	5.25	1.95	
Along strike:				
dx (km): equation 4.11	4.4694	4.3882	0.0945	
dx (deg)	0.0513	0.0504	0.0011	
dy (km): equation 4.10	0.5243	0.9970	9.9996	
dy (deg)	0.0047	0.0090	0.0899	
x*=x1+dx	26.9312	27.1662	26.6283	
y*=y1+dy	38.3790	38.4189	38.1989	
Along dip:				
dx (km): equation 4.11	0.6116	1.1632	1.9535	
dx (deg)	0.0070	0.0133	0.0224	
dy (km): equation 4.10	5.2142	5.1195	0.0185	
dy (deg)	0.0469	0.0460	0.0002	
x_b=x*-dx	**26.9242**	**27.1528**	**26.6059**	
y_b=y*+dy	**38.4259**	**38.4649**	**38.1990**	
Depth: equation 4.13	9.0933	9.0933	11.0791	
Depth + 2 (km)	**11.0933**	**11.0933**	**13.0791**	

Coordinates defining the fault	2 GF north	3 TF south	3 TF interm.	3 TF north
x1 (start longitude)	26.6321	26.8667	26.935	27.0496
y1 (start latitude)	38.5093	38.0309	38.1551	38.2146
x2 (end longitude)	26.6536	26.9350	27.0496	27.1319
y2 (end latitude)	38.3297	38.1551	38.2146	38.3011
a: equation 4.6	-8.35	1.82	0.52	1.05
v: equation 4.7	-83.17	61.19	27.44	46.43
b: equation 4.12	0.12	-0.55	-1.93	-0.95
Strike	173.17	28.81	62.56	43.57
Perpendicular to strike	83.17	118.81	152.56	133.57
Dip	80	80	80	80
Background point				
Distance a. strike, |s|	18.75	1.50	1.50	1.50
Distance a. dip, |c|	1.25	1.50	1.50	1.50
Distance horizontal a. dip, |p|	0.22	0.26	0.26	0.26
Along strike:				
dx (km): equation 4.11	2.2287	0.7228	1.3313	1.0339
dx (deg)	0.0256	0.0083	0.0153	0.0119
dy (km): equation 4.10	18.6171	1.3144	0.6912	1.0867
dy (deg)	0.1674	0.0118	0.0062	0.0098
x*=x1+dx / =x1-dx	26.6577	26.8750	26.9503	27.0615
y*=y1+dy / =y1-dy	38.3419	38.0427	38.1613	38.2244
Along dip:				
dx (km): equation 4.11	0.2155	0.2282	0.1200	0.1887
dx (deg)	0.0025	0.0026	0.0014	0.0022
dy (km): equation 4.10	0.0258	0.1255	0.2312	0.1795
dy (deg)	0.0002	0.0011	0.0021	0.0016
x_b=x*-dx / =x*+dx	**26.6552**	**26.8776**	**26.9517**	**27.0636**
y_b=y*+dy / =y*-dy	**38.3416**	**38.0416**	**38.1592**	**38.2228**
Depth: equation 4.13	1.2310	1.4772	1.4772	1.4772
Depth + 2 (km)	**3.2310**	**3.4772**	**3.4772**	**3.4772**
Asperity point				
Distance a. strike, |s|	18.75	3.00	6.00	4.50
Distance a. dip, |c|	5.00	6.00	6.00	6.00
Distance horizontal a. dip, |p|	0.87	1.04	1.04	1.04
Along strike:				
dx (km): equation 4.11	2.2287	1.4456	5.3250	3.1018
dx (deg)	0.0256	0.0166	0.0611	0.0356
dy (km): equation 4.10	18.6171	2.6287	2.7648	3.2601
dy (deg)	0.1674	0.0236	0.0249	0.0293
x*=x1+dx	26.6577	26.8833	26.9961	27.0852
y*=y1+dy	38.3419	38.0545	38.1800	38.2439
Along dip:				
dx (km): equation 4.11	0.8621	0.9130	0.4801	0.7548
dx (deg)	0.0099	0.0105	0.0055	0.0087
dy (km): equation 4.10	0.1032	0.5020	0.9247	0.7182
dy (deg)	0.0009	0.0045	0.0083	0.0065
x_b=x*-dx / =x*+dx	**26.6478**	**26.8938**	**27.0016**	**27.0939**
y_b=y*+dy / =y*-dy	**38.3410**	**38.0500**	**38.1716**	**38.2375**

Depth: equation 4.13	4.9240	5.9088	5.9088	5.9088
Depth + 2 (km)	**6.9240**	**7.9088**	**7.9088**	**7.9088**
Hypocenter				
Distance a. strike, |s|		1.50		
Distance a. dip, |c|		10.50		
Distance horizontal a. dip, |p|		1.8233		
Along strike:				
dx (km): equation 4.11		0.7228		
dx (deg)		0.0083		
dy (km): equation 4.10		1.3144		
dy (deg)		0.0118		
x*=x1+dx		26.8750		
y*=y1+dy		38.0427		
Along dip:				
dx (km): equation 4.11		1.5977		
dx (deg)		0.0183		
dy (km): equation 4.10		0.8786		
dy (deg)		0.0079		
x_b=x*-dx		**26.8933**		
y_b=y*+dy		**38.0348**		
Depth: equation 4.13		10.3405		
Depth + 2 (km)		**12.3405**		

Coordinates defining the fault	4 SF	5A WMF	5B MMF	5C EMF
x1 (start longitude)	26.8700	27.4936	27.6251	27.9761
y1 (start latitude)	38.3508	38.6097	38.5224	38.4769
x2 (end longitude)	26.8034	27.2885	27.4936	27.6251
y2 (end latitude)	38.1548	38.6315	38.6097	38.5224
a: equation 4.6	2.94	-0.11	-0.66	-0.13
v: equation 4.7	71.23	-6.07	-33.58	-7.39
b: equation 4.12	-0.34	9.41	1.51	7.71
Strike	198.77	276.07	303.58	277.39
Perpendicular to strike	288.77	186.07	213.58	187.39
Dip	80	48	48	48
Background point				
Distance a. strike, |s|	21.25	1.50	1.25	1.25
Distance a. dip, |c|	1.25	1.50	1.25	1.25
Distance horizontal a. dip, |p|	0.22	1.00	0.84	0.84
Along strike:				
dx (km): equation 4.11	6.8366	1.4916	1.0414	1.2396
dx (deg)	0.0785	0.0171	0.0120	0.0142
dy (km): equation 4.10	20.1202	0.1585	0.6914	0.1607
dy (deg)	0.1809	0.0014	0.0062	0.0014
x*=x1+dx / =x1-dx	26.7915	27.4765	27.6131	27.9619
y*=y1+dy / =y1-dy	38.1699	38.6111	38.5286	38.4783
Along dip:				
dx (km): equation 4.11	0.2055	0.1061	0.4626	0.1075
dx (deg)	0.0024	0.0012	0.0053	0.0012
dy (km): equation 4.10	0.0698	0.9981	0.6968	0.8295
dy (deg)	0.0006	0.0090	0.0063	0.0075

x_b=x*-dx / =x*+dx	**26.7892**	**27.4777**	**27.6185**	**27.9631**
y_b=y*+dy / =y*-dy	**38.1705**	**38.6201**	**38.5349**	**38.4858**
Depth: equation 4.13	1.2310	1.1147	0.9289	0.9289
Depth + 2 (km)	**3.2310**	**3.1147**	**2.9289**	**2.9289**
Asperity point				
Distance a. strike, |s|	15.00	6.00	3.75	7.50
Distance a. dip, |c|	5.00	6.00	6.25	5.00
Distance horizontal a. dip, |p|	0.87	4.01	4.18	3.35
Along strike:				
dx (km): equation 4.11	4.8259	5.9664	3.1242	7.4378
dx (deg)	0.0554	0.0685	0.0359	0.0854
dy (km): equation 4.10	14.2025	0.6342	2.0741	0.9642
dy (deg)	0.1277	0.0057	0.0187	0.0087
x*=x1+dx	26.8146	27.4251	27.5892	27.8907
y*=y1+dy	38.2231	38.6154	38.5411	38.4856
Along dip:				
dx (km): equation 4.11	0.8221	0.4243	2.3131	0.4301
dx (deg)	0.0094	0.0049	0.0265	0.0049
dy (km): equation 4.10	0.2793	3.9923	3.4842	3.3179
dy (deg)	0.0025	0.0359	0.0313	0.0298
x_b=x*-dx / =x*+dx	**26.8052**	**27.4300**	**27.6158**	**27.8957**
y_b=y*+dy / =y*-dy	**38.2256**	**38.6513**	**38.5724**	**38.5154**
Depth: equation 4.13	4.9240	4.4589	4.6447	3.7157
Depth + 2 (km)	**6.9240**	**6.4589**	**6.6447**	**5.7157**
Hypocenter				
Distance a. strike, |s|	16.25	4.50	2.50	6.25
Distance a. dip, |c|	11.25	10.50	10.00	10.75
Distance horizontal a. dip, |p|	1.95	7.03	6.69	7.19
Along strike:				
dx (km): equation 4.11	5.2281	4.4748	2.0828	6.1981
dx (deg)	0.0600	0.0514	0.0239	0.0711
dy (km): equation 4.10	15.3860	0.4756	1.3827	0.8035
dy (deg)	0.1384	0.0043	0.0124	0.0072
x*=x1+dx	26.8100	27.4422	27.6012	27.9050
y*=y1+dy	38.2124	38.6140	38.5348	38.4841
Along dip:				
dx (km): equation 4.11	1.8497	0.7426	3.7009	0.9247
dx (deg)	0.0212	0.0085	0.0425	0.0106
dy (km): equation 4.10	0.6285	6.9865	5.5747	7.1335
dy (deg)	0.0057	0.0628	0.0501	0.0641
x_b=x*-dx	**26.7888**	**27.4508**	**27.6437**	**27.9156**
y_b=y*+dy	**38.2181**	**38.6768**	**38.5850**	**38.5483**
Depth: equation 4.13	11.0791	7.8030	7.43145	7.9888
Depth + 2 (km)	**13.0791**	**9.8030**	**9.4314**	**9.9889**

The small contributions are either added or subtracted from the reference coordinates depending on the geometry of the fault. If the fault is dipping towards north with a strike of 263.31^{o}N , like the case is for scenario 1A WIF, a movement along strike is results in a more western and southern coordinate with respect to the reference coordinates (start longitude and latitude). Of this reason the small derivatives found by this movement should be subtracted from the reference point. However when following the fault along the dip this results in yet a more western point, a lower longitude, but a more northern, higher latitude. Another example is the southern segment of the Tuzla fault, 3 TF south, which has a strike of 28.81^{o}N and dipping 80^o towards southeast. Of this reason when moving along strike results in a increase in both latitude and longitude, but when moving along dip this results in a decrease in latitude and an increase in longitude.

It has during the development of this spreadsheet not been possible to make sure the geometry is taken into account automatically, and this geometry consideration has therefore been made.

D Catalogue of Normal Faulting Earthquakes

In order to estimate the maximum possible magnitude for the normal fault events simulated in the thesis, there have been gathered a worldwide covering catalog for normal fault events. This catalog covers the time period 1653 to 1995 and it is not assumed to be complete, but is used as a rule of thumb when checking the magnitudes calculated for the scenario earthquakes.

Table D.1:List of normal faults earthquakes worldwide in the time period of 1653 to 1995, the list is not assumed to be complete. There is given indications in the mechanism column if the source have indicated that the event was oblique, either with a left lateral or a right lateral component.

Time	Location	Ms	Ms	M	Mech.
1653.02.22	Menderes, Turkey	7.1			
1861.12.26	Vostiza, Greece	6.6			
1870.08.01	Fokis, Greece	6.7			
1875.05.03	Civril, Turkey	6.5			
1880.07.29	Emiralan, Turkey	6.5			
1887.05.03	Pitaycachi, Mexico	7.4			
1887.09.30	Banaz, Turkey	6.3			
1894.04.27	Martin, Greece	6.9			
1899.09.20	Menelin, Turkey	6.9			
1904.04.04	Struma, Bulgaria	7.2			
1905.06.01	Scutari, Albania	6.3			
1912.08.09	Marmara, Turkey*	7.4			NR
1914.10.03	Burdur, Turkey	7.0			NR
1915.01.13	Avezzano, Italy	7.0			
1915.10.03	Plesant Velly, USA	7.6			
1928.01.06	Laikipia, Kenya	7.0			
1928.04.14	Plovdiv, Bulgaria	6.8			
1928.04.18	Papazili, Bulgaria	6.9	7.0		
1930.05.06	Salmas, Iran	7.4			NR
1932.09.26	Ieriss, Greece	6.9			
1944.06.25	Saphane, Turkey	6.0			NR
1946.11.10	Ancash, Peru	7.2		7.28	
1950.12.14	Fort Sage Mtns., USA	5.6			
1954.04.30	Sofades, Greece	6.7			
1954.07.06	Rainbow Mountains, USA	6.3		6.22	
1954.08.24	Stillwater, USA	6.9		6.55	
1957.03.08	Velestin, Greece	6.6			NL
1957.03.22	San Fransisco, USA	5.3		5.21	
1959.08.18	Hebgen Lake, USA	7.6		7.29	
1962.08.30	Cache Valley, USA	5.7		5.78	
1964.10.06	Manyas, Turkey	6.8			NR
1966.08.19	Varto, Turkey	6.8			RN
1966.08.20	Varto, Turkey	6.2			RN
1966.10.29	Acarnan, Greece	5.8			

1967.11.30	Debar, Albania	6.6			NL
1968.02.19	Ag.Efstr, Greece	7.3			RN
1969.03.28	Alasehir Valley, Turkey	6.5		6.71	NL
1970.03.28	Gediz, Turkey	7.1		7.17	NL
1971.03.12	Burdur, Turkey	6.2			
1973.07.14	Tibet, China	6.9		6.95	
1975.03.28	Pocatello Vally, USA	6.0		6.06	
1975.06.30	Yellowstone, USA	5.9		5.88	NR
1975.08.01	Oroville, USA	5.6		6.01	NR
1977.09.30	Unita Basin, USA	5.1			
1978.06.20	Thessaloniki, Greece	6.4		6.43	
1978.10.04	Wheeler Crest, USA	5.1		5.47	
1979.12.26	Carliste, England	4.8			NR
1980.02.29	Arudy, France	4.9		5.17	
1980.07.09	Almyros, Greece	6.4		6.59	
1980.11.23	South Apennines, Italy	6.9		6.91	
1981.02.24	Corinth, Greece	6.7		6.63	
1981.02.25	Corinth, Greece	6.4		6.31	
1981.03.04	Corinth, Greece	6.4	6.3	6.25	
1982.12.13	Dhamar, North Yemen	6.0		6.34	
1983.05.10	Taipingshan, Taiwan	5.4		5.72	
1983.10.28	Borah Peak, USA	7.3		6.93	NL
1984.04.29	Perugia, Italy	5.3		5.65	
1984.05.07	Lazio-Abruzzo, Italy	5.8		6.00	
1986.04.05	Cozco. Peru	4.6		5.22	
1986.09.13	Kalamata, Greece	5.8	5.7	5.93	
1987.03.02	Edgecumbe, New Zealand	6.6		6.50	
1987.05.28	Kameoka, Japan	4.9			
1992.06.29	Little Skull Mtn., USA	5.4		5.69	
1993.05.17	Eureka Valley, USA	5.8		6.08	
1995.05.13	Kozani, Greece	6.5			
1995.10.01	Dinar, Turkey	6.2			NR

** This event happend on the North Anatolian Fault, a strike-slip fault, however the event had a large obligue component.*

The list of normal fault events has been gathered from Ambraseys and Jackson (1998), Somerville et al. (1999) and Wells and Coppersmith (1994).

E GMS: Program Package

In order to conduct the ground motion simulation there have been used a program package developed by Nelson Pulido and tested in several previous studies (REF!). The ground motion simulations are divided into two parts; low frequency and high frequency according to the methods used as described in chapter 2. Afterwards the low frequency and high frequency contributions to the ground motion simulations have been summed.

In the following are enclosed descriptions of the used FORTRAN™ programs, input files and Matlab™ used in the ground motion simulation, and given on the enclosed CD-ROM to this thesis. In appendix F there is given the entire database of parameters used in the ground motion simulations created for each scenario earthquake. The database is also put on the enclosed CD.

E.1 Low frequencies

E.1.1 coord.f

The FORTRAN™ program coord.f calculates distance between each point source and all stations for the asperities. In order to run this program there must be created a directory called coordinates/ in the working directory, this is where the output is written.

The input file is called coord.asp1.ctl for asperity one, coord.asp2.ctl for asperity two etc, and they should contain the following parameters, in given order.

Parameters:

- Asperity number
- Spacecoordinates from where the asperity is defined. Depth is given in meters. (This is the coordinates given in bold in appendix C, calculations, for the backgrounds and asperities.)
- ds, dw: the length of subfaults along strike and dip in meters.
- Scale (m/degree) of latitude and longitude

- Number of subfault planes **(always 1)**
- Strike
- Dip
- ns, nw: Number of subfaults along strike and dip
- iss: subfault, along strike, for which the defining coordinate is given (counted along strike)
- isw: subfault, along dip, for which the defining coordinate is given (counted from surface)
- Directory to write coord files (…/coordinates/)
- Depth of stations (0 for the surface)
- Number of stations in the simulations, (in this study there is simulated for 334 stations).
- Coordinate reading order (lat or lon first)
- Station names and coordinates

The program is called by typing *coord < coord.aspx.ctl* (x referring to asperity number) in a command prompt window, when running the program in Windows.

E.1.2 green.f

The FORTRAN™ program green.f calculates Green's functions for every subfault in all asperities using coordinates from coord.f and a structure file, which must be saved for each station in a …/structure/ directory located in the working directory.

The structure file should be given with the following parameters

- NC : number of layers velocity model
- NFREQ : nyquist number = TL/(2*dt)
- TL : duration of the signal
- dt: sampling time
- XL : distance between neighbor imaginary sources (see Bouchon BSSA 81). XL should be larger than TL*Vpmax+Rmax (Vpmax is the largest P wave velocity in the velocity model and Rmax is the epicentral distance of the furthest receiver).
- IKMAX : maximum number of iterations in the frequency wave number method (~5000)
- XS and YS: local coordinates of receivers in the original program. Set them to zero. The coordinates of receivers are read from output files in .../coordinates/ from green.f as well as matlab programs
- AW, NR and UCONV should not be changed!

The velocity model should be structured as:

Depth of top of layer Vp Vs rho Qp Qs

Qp and Qs are used for the low frequency Green's function calculation. They are approximately calculated as Qp=Vp/10 and Qs=Qp/2, if the are not given in the used velocity model. A frequency dependent Q is only used for the high frequency part.

Output is written in …/green1/, …/green2/ etc. which must have a subdirectory for each station.

The input file is called green.asp1.ctl for asperity one, green.asp2.ctl for asperity two etc, and they should contain the following parameters, in given order.

Parameters:

- ndatas: Number of subfaults along dip
- nstati: Number of subfaults along strike
- nw1: Number of subfaults along dip
- ns1: **(Always 1)**
- ns2: Number of subfaults along strike
- Directory for structure files (…/structure/).
- Directory for writing output (…/green1/ for asperity 1 etc. contains a subdirectory for each station)
- Directory to find coordinates (…/coordinates/)
- Number of stations
- Station names listed one by one

The program is called by typing *green < green.aspx.ctl* (x referring to asperity number) in a command prompt window, when running the program in Windows.

E.1.3 conv_risetime.f

The FORTRAN™ program convolves green's functions with point source mechanisms. The Matlab™ routine *random_risetime.m* located in …/mfiles/ must be used to create rt_aspx.txt, x referring to asperity number.

In the Matlab™ routine random_risetime.m, *ave_rt* is the average risetime and *d_rt* is the variation, this insures a small variation in risetime for the different subfaults.

Output is written in …/conv1/, …/conv2/ etc. which must have a subdirectory for each station.

The input file is called conv.asp1.ctl for asperity one, conv.asp2.ctl for asperity two etc, and they should contain the following parameters, in given order.

Parameters:

- isc: source type; 5 is smt. ramp
- Rise time (name of file created by random_risetime.m, rt_asp1.txt for asperity 1 etc.)
- icc: output (disp = 1, vel = 2 or acc = 3)
- nx, nw: number of subfaults in strike, dip direction
- Number of subfaults, **(always 1)**
- nx1: **(always 1)**
- nx2: number of subfaults in strike direction
- nw1: number of subfaults in dip direction
- Strike
- Dip
- Rake
- Asperity seismic moment (see calculations below)
- Number of Green's functions (nx * nw)
- Directory to find Green's functions (green1/ for asperity 1 etc. contains a subdirectory for each station)
- Directory to put output conv files (conv1/ for asperity 1 etc. contains a subdirectory for each station)
- Number of stations
- Station names listed one by one

The seismic moment is divided between asperity and background seismic moment in a 40/60 ratio of the total seismic moment according to the equations (E.1-E.2) depending if there is one or several asperities defined in the earthquake scenario at hand.

$$M_{0,asperities} = 0.4 \cdot M_0 \quad \text{Eq. E.1}$$

$$M_{0,background} = 0.6 \cdot M_0 \quad \text{Eq. E.2}$$

In the case of two asperities and/or background segments the seismic moment is divided out to the different asperities with respect to the area of the asperities according to equation E.3-E.6.

$$M_{0,asperity\ 1} + M_{0,asperity\ 2} = M_{0,asperities} = 0.4 \cdot M_0 \quad \text{Eq. E.3}$$

$$\frac{M_{0,asperity\ 1}}{M_{0,asperity\ 2}} = \left(\frac{A_{asperity\ 1}}{A_{asperity\ 2}}\right)^{3/2} \quad \text{Eq. E.4}$$

$$M_{0,background\ 1} + M_{0,background\ 2} = M_{0,background} = 0.6 \cdot M_0$$

Eq. E.5

$$\frac{M_{0,background\ 1}}{M_{0,background\ 2}} = \left(\frac{A_{background\ 1}}{A_{background\ 2}} \right)^{3/2} \qquad \textit{Eq. E.6}$$

In the above equations M_0 is the seismic moment and *A* referes to the area of either the asperities or the backgrounds.

Equation E.3-E.6 is in the case of only 2 segments with one asperity in each. If the scenario is set up with three segments (assuming one asperity in each), the equations would be as given in equation E.7-E.12.

$$M_{0,asperity\ 1} + M_{0,apserity\ 2} + M_{0,asperity\ 3} = 0.4 \cdot M_0 \qquad \textit{Eq. E.7}$$

$$\frac{M_{0,asperity\ 1}}{M_{0,asperity\ 2}} = \left(\frac{A_{asperity\ 1}}{A_{asperity\ 2}} \right)^{3/2} \qquad \textit{Eq. E.8}$$

$$\frac{M_{0,asperity\ 1}}{M_{0,asperity\ 3}} = \left(\frac{A_{asperity\ 1}}{A_{asperity\ 3}} \right)^{3/2} \qquad \textit{Eq. E.9}$$

$$M_{0,background\ 1} + M_{0,background\ 2} + M_{0,background\ 3} = 0.6 \cdot M_0 \qquad \textit{Eq. E.10}$$

$$\frac{M_{0,background\ 1}}{M_{0,background\ 2}} = \left(\frac{A_{background\ 1}}{A_{background\ 2}} \right)^{3/2} \qquad \textit{Eq. E.11}$$

$$\frac{M_{0,background\ 1}}{M_{0,background\ 3}} = \left(\frac{A_{background\ 1}}{A_{background\ 3}} \right)^{3/2} \qquad \textit{Eq. E.12}$$

When the asperity and background seismic moments are found this should be divided by the number of the subfaults of the asperity/background following equation E.13 and E.14.

$$M_{apserity} = \frac{M_0 \cdot 0.4}{n_x \cdot n_w} \qquad \textit{Eq. E.13}$$

$$M_{background} = \frac{M_0 \cdot 0.6}{n_x \cdot n_w} \qquad \textit{Eq. E.14}$$

The program is called by typing Conv_risetime < *conv.aspx.ctl* (x referring to asperity number) in a command prompt window, when running the program in Windows.

E.2 High frequencies

E.2.1 Make_rad_pat.m

The Matlab™ routine *make_rad_pat.m* calculates the frequency dependent radiation pattern, as described in chapter 3.2.3. The output from this routine is *Grad_all.mat.*

There is no input file for this Matlab™ routine; however the asperity parameters are all defined in the script above the calculations.

Parameters:

- nstations: number of stations
- nasperities: number of asperities
- fr: frequencies for transformation from double couple to spherical radiation pattern
- The two intermediate frequencies used for (1.5 and 2.5 Hz) is the frequency interval for the transition from double couple to spherical source radiation. Please refer to Pulido and Kubo (2004) for the choise of these frequencies.
- dircoor: main working directory for scenario (e.g. ../SCENARIO1/)
- Hypocenter location (longitude, latitude, depth)
- coord: file with station coordinates (save in …/mfiles/). Must be written “longitude latitude”!
- For each asperity: strike, dip, slip

The Matlab™ routine *make_rad_pat.m* uses the following routines:

- *travel_time_ao.m*: include velocity model: v gives velocities of layers; d gives depth (in km) to layer boundaries.
- *travel_takeoff.m*: include velocity model, same format as for travel_time_ao.m.
- *lon_lat_scale.m*: No changes necessary.
- *read_coord_subfault.m*:
    - dirc: directory to find coordinates (from coord.f), usually …/coordinates/.
- *radiation_pat_rev.m*: No changes necessary
- *radiation_pattern.m*: No changes necessary

The program is called by typing *make_rad_pat* in Matlab™.

E.2.2 All_high_ori.m

The Matlab™ routine all_high_ori.m calculates the high frequency seismograms. The output should be saved in …/high/.

There is no input file for this Matlab™ routine; however the asperity parameters are all defined in the script above the calculations.

Parameters:

- nstations: number of stations
- nasperity: number of asperities
- ni: **Not used**
- dirname; full path to mfiles directory (e.g. …/high/)
- Hypocenter: longitude, latitude, depth (in kilometers)
- frad: frequencies used in *make_rad_pat.m*.
- Qcoef(1): Q, Qcoef(2): Frequency dependency of Q (Very important parameters, that should be found/tried to be found for the area of simulations.)
- Fmax (upper frequency in the calculations)
- fs: Calculate for bedrock outcrop site (2) or site under surface (1). (This is the free surface factor which is equal to 2 for an outcrop receiver and approaches 1 for a receiver deep enough (i.e. more than 200m or so))
- fband: frequency band for computations, fstop: (these are intervals for a Tchebichev type filter, shown below.)

  Tchenbichev type filter:

  ```
   fband1      fband2
      __________
     /          \
    /            \
   /              \
  fstop1         fstop2
  ```

- dt: time step in resulting waveforms
- File with coordinates for stations (longitude latitude) (coordinates_stations.txt)
- For each asperity:
  - betav: Average S velocity, calculated as: $Saverage = Htot/\Sigma(Hi/Vsi)$ where Htot is total thickness of seismogenic layer, and Hi and Vsi are the thickness and S wave velocity of the ith layer of the velocity model.
  - row: Average density, calculated by: Average density is a layer thickness weighted average of the velocity model. Density at each layer can be obtained approximately as (in T/m^3): $\rho = 1.4 + 0.67*Vs^{0.5}$

- sdp: Stress drop

- smt: asperity seismic moment (divided by number of subfaults and Nt **(=5)**. Nt is a scaling factor between slip function of mainshock and aftershocks. Rise time mainshock is equal to Nt times the rise time of aftershock (or synthetic point source in this case). Therefore smt = $(M_0 * 0.4)/(n_x * n_w * 5)$
- For each asperity:
    - Strike
    - Dip
    - Slip
    - dxa: length (km) of subfaults in strike direction
    - dwa: length (km) of subfaults in dip direction
    - rt: average rise time
    - d_rt: variance in rise time
    - nxa: number of subfaults in strike direction
    - nwa: number of subfaults in dip direction
    - vr: average rupture velocity
    - d_vr: variance rupture velocity

The Matlab™ routine *all_high_ori.m* uses the following routines:

- *starting_point_rupture.m*: set coordinates\ directory
- *boore_radi_ori.m*: no changes necessary
- *egf_boore radi.m*: no changes necessary
- *integral.m*: no changes necessary

The program is called by typing *all_high_ori* in Matlab™.

E.2.3 All_pga_pgv.m

The Matlab™ routine all_pga_pgv.m calculates the peak ground acceleration (PGA) and peak ground velocity (PGV) for all the stations, and writes it to the output files.

There is no input file for this Matlab™ routine; however the asperity parameters are all defined in the script above the calculations.

Parameters:

- nsimu: number of stations
- Hypocenter, longitude, latitude, depth (in kilometers)
- File to find station coordinates (longitude latitude) (coordinates_stations.txt)
- Output files with spectral information? 0=no, 1=yes

The Matlab™ routine *all_high_ori.m* uses the following routines:

- *Lo_hi_sum.m*: no changes necessary
- *Low.m***:**
    - dirname: full path to main scenario directory (e.g. .../SCENARIO1/)

- fband: frequency band for low frequencies
- fstop: same as before

Asperity parameters:

- nx: number of subfaults along strike
- nz: number of subfaults along dip
- ls, ld: length of subfaults (km) along strike, dip
- vro: rupture velocity between the hypocenter and the closet point to asperity
- vri: rupture velocity within asperity (usually the same as vro)
- d_vri: variability of rupture velocity

- *High.m*:
  - dirname: full path to …/high/ directory (e.g. c:/IZMIR/1A_WIF/high/)
  - fband: frequency band for high frequencies
  - fstop

  Asperity parameters:
  - vro=rupture velocity
  - ls=length of subfault along strike
- *low_asperity.m*: names of conv directories must be defined (output directories from conv_risetime, …/conv1/, …/conv2/ etc.)
- *readzoo.m*: no changes necessary
- *acc_spectra_shake.f*: must be compiled, *response.par must be present!* The parameters are values of period at which response spectra is calculated.
- *vel_spectra_shake.f*: must be compiled, *response.par must be present!*
- *ovelap_lo_hi.m*: no changes necessary
- *fourier_dim.m*: no changes necessary

The program is called by typing *all_pga_pgv_ori* in Matlab™.

E.2.4 Plot_onef.m

The Matlab™ routine plot_one.m plots single stations waveforms and the corresponding spectra. The routine uses many of the routines also used by all_pga_pgv.m. The output is written in the directories .../waveforms/ and …/spectra/.

Parameters:

- - Hypocenter location (longitude, latitude, depth (in kilometers))
- - enter: Make output files? 0=no, 1=yes
- - model: model name
- - coord: name of file with station coordinates (longitude latitude) (coordinates_staions.txt)
- - Scale parameters for plots can be set around line 29: tlim = 300, aspmin = 0.0001, aspmax = 2000

The program is called by typing plot_one('xxx') in Matlab™, *xxx* referring to the station number, in this study a number between 001 to 334.

F GMS: Input Parameters

During the work with this thesis there is created a database containing all the input parameters used in the ground motion simulations. The entire database is given in the following, however, the databse is also given on the enclosed CD. The databse for each earthquake scenario is given as a sub-paragraph. There is however, only given desciptions of the input parameters in the first paragraph conserning the earthquake scenario 1A WIF. For the resulting eigth scenarios there is used the same structure. The input used for constructing the structure file is identical for all nine earthquake scenarios, and it is therefore only given once in table F.3.

The terms used for defining the parameters in the following are consistent with the terms used in the description of the programs given in appendix E. The short names asp and bg are used for asperity and background respectively.

F.1 1A WIF, Western Izmir Fault segment

The home directory for the earthquake scenario is c:\IZMIR\1A_WIF\ and all references to directories are given from this directory.

F.1.1 General data

First spreadsheet in the excel file for a scenario earthquake contains some general information of the event, such as the focal mechanism, magnitude and the epicentre location of the event. Furthermore there are given parameters for the asperity and background segment used for setting up the scenario earthquake.

Table F.1: General data describing the earthquake scenario geometry and kinematic rupture parameters for the asperity and background.

General data	Unit	Value
Length	km	18
Strike	deg	263.31
Dip	deg	60
Rake	deg	-100
Seismic moment	Nm	6.24E+18
Moment magnitude	x	6.46

Epicenter, longitude	deg E	26.9242	
Epicenter, latitude	deg N	38.4259	
Epicenter, depth	km	11.0933	
Model parameters	**Unit**	**Asperity**	**Background**
Asperity width	km	6	15
Asperity length	km	9	18
Depth asperity (upper edge)	km	6.5	2
Strike	deg	263.31	263.31
Dip	deg	60	60
Rake	deg	-100	-100
Seismic moment asperity M_0	Nm	2.50E+18	3.74E+18
Asperity rise time	s	1	1
Rupture velocity asperity	km/s	2.5	2.5
Stress drop (Ds_{ave}/0.22)	Bar	115.83	5.79
Number of subfaults inside asperity		6	30
Q		82	82
f_{max}		10	10

F.1.2 Input to coord.f

The first program used in the ground motion simulations is the FORTRAN™ program *coord.f*. This calculates the distance between each point source on the fault plane to all the stations. The input parameters for this program are given in table F.2.

Table F.2: Input parameters used in the FORTRAN™ program coord.f.

Parameters	Units	Asperity	Background
Asperity number	x	1	2
Defining latitude of the asperity/background	deg	38.4074	38.3826
Defining longitude of the asperity/background	deg	26.9443	26.896
Defining depth of the asperity/background	m	7196	3299
ds (length of subfaults along strike)	m	3000	3000
dw (length of subfaults along dip)	m	3000	3000
ulat (scale latitude)	km/deg	111.2	111.2
ulong (scale longitude)	km/deg	87.14	87.14
Number of subfault planes (always 1)	x	1	1
Strike	deg	263.31	263.31
Dip	deg	60	60
ns	x	3	6
nw	x	2	5
iss	x	3	6
isw	x	1	1
Output directory	x	..\coordinates\ coord1.***.out	..\coordinates\ coord2.***.out
Depth of the station	m	0	0
Number of stations	x	334	334
Reading coordinate order	x	1	1

F.1.3 Input to green.f

The green.f FORTRAN™ program calculates the Green's functions for every subfault in all the asperity and background segments. In order to do this there is needed a file containing information about the crustal structure, the content of this file is given in table F.3.

Table F.3: Input parameters for the structure file.

Parameters	Value	Layer 1	Layer 2	Layer 3	Layer 4	Layer 5
Seismogram						
NFREQ	256	x	x	x	x	x
TL	102.4	x	x	x	x	x
XL	8.00E+05	x	x	x	x	x
dt	0.03	x	x	x	x	x
Crust model						
NC, number of layers	5	x	x	x	x	x
Upper depth of the layer (m)	x	0	2000	10000	15000	33000
Vp (km/sec)	x	4.5	5.8	5.5	6.1	7.85
Vs (km/sec)	x	2.6	3.35	3.2	3.87	4.53
ρ (g/m^3)	x	2	2.5	2.35	2.8	3.1
Qp	x	100	200	190	350	1000
Qs	x	80	100	95	175	500
Other parameters						
IKMAX	5000	x	x	x	x	x
AW	2	x	x	x	x	x
NR	1	x	x	x	x	X
UCONV	1.00E-04	x	x	x	x	x

The input parameters used by the *green.f* program are given in table F.4.

Table F.4: Input parameters used by the FORTRAN™ program green.f.

Parameters	Asperity	Background
ndatas (nw) (=nw in coord_inputs.txt)	2	5
nstati (nx) (=ns in coord_inputs.txt)	3	6
nw1 (=nw in coord_inputs.txt)	2	5
ns1 (nx1)	1	1
ns2 (nx2)	3	6
Directory for structure files	..\structure***	..\structure***
Output directory	..\green1******.1	..\green2******.2
Coordinates directory	..\coordinates\ coord1.***.out	..\coordinates\ coord2.***.out
Number of stations	334	334

F.1.4 Input to conv_risetime.f

The FORTRAN™ program *conv_risetime.f* convolves the Green's functions with the point source mechanisms. The input parameters used are given in table F.5. The calculations of the seismic moment for the background and asperity are descriped in appendix E, paragraph E.1.3.

Table F.5: Input parameters for the FORTTRAN™ program conv_risetime.f.

Parameters	**Units**	**Asperity**	**Background**
ics (1=ricker; 2=step; 3=stock; 5=smt.ramp; 6=brune)	x	5	5
Rise time (for ics=5-smt.ramp)	s	1	2
icc (1=dis.; 2=vel.; 3=acc.)	x	3	3
nx, number of subfaults along strike	x	3	6
nw, number of subfaults along dip	x	2	5
number of subfaults (always 1)	x	1	1
nx1(1) (always 1)	x	1	1
nx2(1), number of subfaults along strike	x	3	6
nw1(1), number of subfaults along dip	x	2	5
Strike angle	deg	263.31	263.31
Dip angle	deg	60	60
Rake angle	deg	-100	-100
Asperity seismic moment (Masp/(nx*nw))	N*m	4.16E+17	1.25E+17
Number of Green's functions (nx*nw)	x	6	30
Green's functions directory	x	..\green1******.1	..\green2******.2
Output convolution directory	x	..\conv1******.1	..\conv2******.2
Number of stations	x	334	334

F.1.5 Input to make_rad_pat.m

The frequency dependent radiation pattern described in chapter 3.2.3 is calculated with a Matlab™ routine called *make_rad_pat.m*. The parameters needed for this routine is given in table F.6.

Table F.6: Input parameters used in the Matlab™ routine make_rad_pat.m.

Parameters	**Units**	**Value**	**Asperity**	**Background**
Nsations	x	334	x	x
Nasperity	x	2	x	x
Fr	Hz	1;1.5;2.5;3	x	x
Hypocenter, longitude	deg	26.9242	x	x
Hypocenter, latitude	deg	38.4259	x	x
Hypocenter, depth	m	11.0933	x	x
Model parameters				
Strike (of the asperity)	deg	x	263.31	263.31
Dip (of the asperity)	deg	x	60	60
Slip (of the asperity)	deg	x	-100	-100
Depth (of the asperity)	km	x	6,5	2

F.1.6 Input for all_high_ori.m

The Matlab routine all_high_ori.m calculates the high frequency seismograms. The parameters needed for this routine is given in table F.7.

Table F.7: Input parameters used in the Matlab™ routine all_high_ori.m.

Parameters	Units	Value	Asperity	Background
nstations	x	334	x	x
nasperity	x	2	x	x
Directory to high frequency data	x	..\high	x	x
Hypocenter, longitude	deg	26.9242	x	x
Hypocenter, latitude	deg	38.4259	x	x
Hypocenter, depth	deg	11.0933	x	x
Frad	Hz	1;1.5;2.5;3	x	x
Qfact		82	x	x
Qexp		1	x	x
Fmax	Hz	x	10	10
fsur (usually=2)	x	x	2	2
Fband	Hz	1.5;10	x	x
Fstop	Hz	1;15	x	x
dt, sampling rate	s	0.03	x	x
DATA BOORE				
betav (average shear-wave velocity)	km/s	x	3.621	3.621
row (average density)	g/cm3	x	2.66	2.66
sdp, stress drop for the asperity only	bar	x	115.83	5.7915
smt, asperity seismic moment	N*m	x	8.32E+16	2.496E+16
DATA empirical Green's functions				
Strike	deg	x	263.3097	263.3097
Dip	deg	x	60	60
Slip	deg	x	-100	-100
dxa, length of subfault along strike	km	x	3	3
dwa, length of subfault along dip	km	x	3	3
rt, average rise time	s	x	1	1
d_rt, variance in rise time	s	x	0.4	0.4
nxa, number of subfaults along strike	x	x	3	6
nwa, number of subfaults along dip	x	x	2	5
Nta	x	x	5	5
vr, average rupture velocity	km/s	x	2.5	2.5
d_vr, variance in rupture velocity	km/s	x	0.5	0.5

F.1.7 Input for all_pga_pgv.m

The Matlan™ routine *all_opga_pgv.m* calculates the peak ground motion for each station defined in the study area. The input needed for this calculation is given in table F.8.

Table F.8: Input parameters used in the Matlab™ routine all_pga_pgv.m.

Parameter	Units	Values
nsimu	x	334

Hypocenter, longitude	deg	26.9242
Hypocenter, latitude	deg	38.4259
Hypocenter, depth	deg	11.0933
Output with spectral information	x	1

The Matlab™ routine *all_pga_pgv.m* uses several subroutines, for two of these routines specific fault related parameters to the earthquake scenario at hand is needed, this is for the routine *low.m* and *high.m*. Table F.9 contains these parameters.

Table F.9: Input parameters used by the Matlab™ routines low.m and high.m.

Parameters	**Units**	**Asperity**	**Background**
Low.m			
Fband	Hz	0.1;1.0	0.1;1.0
Fstop	Hz	0.05;1.5	0.05;1.5
nx (nº of elements in strike direction)	x	3	6
nz (nº of elements in dip direction)	x	2	5
ls (length subfault in the strike direction)	m	3000	3000
ld (length subfault in dip direction)	m	3000	3000
vro (rupture velocity hypocenter to asperity)	km/s	2.5	2.5
vri (rupture velocity inside the asperity)	km/s	2.5	2.5
d_vri, variability of rupture velocity	km/s	0.5	0.5
High.m			
dt (delay time for high freq)	s	0.03	0.03
dirname (directory name for high freq)	x	..\high	..\high
Fband	Hz	1.5;10	1.5;10
Fstop	Hz	1;15	1;15
vro (hypocentral distance outside asperity)	m/s	2.5	2.5
ls (length subfault in the strike direction)	m	3000	3000

F.1.8 Input for plot_onef.m

The Matlab™ routine *plot_onef.m* is used to plot waveforms and corresponding spectra for single stations. The input parameters needed for this routine is given in table F.10.

Table F.20: Input parameters for the Matlab™ routine plot_onef.m.

Parameter	Units	Values
Hypocenter, longitude	deg	26.9242
Hypocenter, latitude	deg	38.4259
Hypocenter, depth	deg	11.0933
Outputfine, 0=no, 1=yes	x	1
Model name	x	1A_WIF_

F.2 1B EIF, Eastern Izmir Fault segment

The home directory for the earthquake scenario is c:\IZMIR\1B_EIF\ and all references to directories are given from this directory.

F.2.1 General data

Table F.3: General data describing the earthquake scenario geometry and kinematic rupture parameters for the asperity and background.

General data	Unit	Value	
Length	km	21	
Strike	deg	257.20	
Dip	deg	60	
Rake	deg	-100	
Seismic moment	Nm	8.18E+18	
Moment magnitude	x	6.54	
Epicenter, longitude	deg E	27.1528	
Epicenter, latitude	deg N	38.4655	
Epicenter, depth	km	11.0933	
Model parameters	**Unit**	**Asperity**	**Background**
Asperity width	km	6	15
Asperity length	km	12	21
Depth asperity	km	6.5	2
Strike	deg	257.1989	257.1989
Dip	deg	60	60
Rake	deg	-100	-100
M_0, asperity	Nm	3.27E+18	4.91E+18
Risetime	s	1	1
Rupture velocity	km/s	2.5	2.5
Stress drop	Bar	115.83	5.7915
N^o subfaults	x	8	35
Q	x	82	82
f_{max}	x	10	10

F.2.2 Input to coord.f

Table F.12: Input parameters used in the FORTRAN™ program coord.f.

Parameters	Units	Asperity	Background
Asperity number	x	1	2
Defining latitude	deg	38.4482	38.4195
Defining longitude	deg	27.1753	27.1307
Defining depth	m	7196	3299
Ds	m	3000	3000
Dw	m	3000	3000
ulat (scale latitude)	km/deg	111.2	111.2
ulong (scale longitude)	km/deg	87.14	87.14
N^o subfault planes	x	1	1
Strike	deg	257.1989	257.1989

Dip	deg	60	60
Ns	x	4	7
nw	x	2	5
iss	x	4	7
Isw	x	1	1
Output directory	x	..\coordinates\ coord1.***.out	..\coordinates\ coord2.***.out
Depth of station	m	0	0
N° of stations	x	334	334
Reading order	x	1	1

F.2.3 Input to green.f

Table F.43: Input parameters used by the FORTRAN™ program green.f.

Parameters	Asperity	Background
ndatas	2	5
nstati	4	7
nw1	2	5
ns1 (nx1)	1	1
ns2 (nx2)	4	7
Directory structure files	..\structure***	..\structure***
Output directory	..\green1******.1	..\green2******.2
Coordinates directory	..\coordinates\ coord1.***.out	..\coordinates\ coord2.***.out
N° stations	2	5

F.2.4 Input to conv_risetime.f

Table F.5: Input parameters for the FORTTRAN™ program conv_risetime.f.

Parameters	Units	Asperity	Background
ics	x	5	5
Risetime	s	1	1
icc (1=dis.; 2=vel.; 3=acc.)	x	3	3
nx	x	4	7
nw	x	2	5
N° subfaults (always 1)	x	1	1
nx1(1) (always 1)	x	1	1
nx2(1)	x	4	7
nw1(1)	x	2	5
Strike	deg	257.1989	257.1989
Dip	deg	60	60
Rake	deg	-100	-100
Masp/(nx*nw)	N*m	4.09E+17	1.40E+17
nx*nw	x	1	1
Green's directory	x	..\green1******.1	..\green2******.2
Output directory	x	..\conv1******.1	..\conv2******.2
N° stations	x	5	5

F.2.5 Input to make_rad_pat.m

Table F.6: Input parameters used in the Matlab™ routine make_rad_pat.m.

Parameters	Units	Value	Asperity	Background
nsations	x	334	x	x
nasperity	x	2	x	x
fr	Hz	1,5;2,5	x	x
Hypocenter, longitude	deg	27.1528	x	x
Hypocenter, latitude	deg	38.4655	x	x
Hypocenter, depth	m	11.0933	x	x
Model parameters				
Strike	deg	x	257.1989	257.1989
Dip	deg	x	60	60
Slip	deg	x	-100	-100
Depth	km	x	6.5	2

F.2.6 Input for all_high_ori.m

Table F.7: Input parameters used in the Matlab™ routine all_high_ori.m.

Parameters	Units	Value	Asperity	Background
nstations	x	334	x	x
nasperity	x	2	x	x
High freq. directory	x	..\high	x	x
Hypocenter, longitude	deg	27.1528	x	x
Hypocenter, latitude	deg	38.4655	x	x
Hypocenter, depth	deg	11.0933	x	x
frad	Hz	1;1.5;2.5;3	x	x
Qfact		82	x	x
Qexp		1	x	x
fmax	Hz	x	10	10
fsur (usually=2)	x	x	2	2
fband	Hz	1.5;10	x	x
fstop	Hz	1;15	x	x
dt, sampling rate	s	0.03	x	x
DATA BOORE				
betav	km/s	x	3.621	3.621
row	g/cm3	x	2.66	2.66
sdp	bar	x	115.83	5.7915
smt	N*m	x	8.18E+16	2.804E+16
DATA empirical Green's functions				
Strike	deg	x	257.1989	257.1989
Dip	deg	x	60	60
Slip	deg	x	-100	-100
dxa	km	x	3	3
dwa	km	x	3	3
rt	s	x	1	1
d_rt	s	x	0.4	0.4
nxa	x	x	4	7
nwa	x	x	2	5
nta	x	x	5	5

vr	km/s	x	2.5	2.5
d_vr	km/s	x	0.5	0.5

F.2.7 Input for all_pga_pgv.m

Table F.8: Input parameters used in the Matlab™ routine all_pga_pgv.m.

Parameter	**Units**	**Values**
nsimu	x	334
Hypocenter, longitude	deg	27.1528
Hypocenter, latitude	deg	38.4655
Hypocenter, depth	deg	11.0933
Output	x	1

Table F.9: Input parameters used by the Matlab™ routines low.m and high.m.

Parameters	**Units**	**Asperity**	**Background**
Low.m			
fband	Hz	0.1;1.0	0.1;1.0
fstop	Hz	0.05;1.5	0.05;1.5
nx	x	4	7
nz	x	2	5
ls	m	3000	3000
ld	m	3000	3000
vro	km/s	2.5	2.5
vri	km/s	2.5	2.5
d_vri	km/s	0.5	0.5
High.m			
dt	s	0.03	0.03
dirname	x	..\high	..\high
fband	Hz	1.5;10	1.5;10
fstop	Hz	1;15	1;15
vro	m/s	2.5	2.5
ls	m	3000	3000

F.2.8 Input for plot_onef.m

Table F.19: Input parameters for the Matlab™ routine plot_onef.m.

Parameter	Units	Values
Hypocenter, longitude	deg	27.1528
Hypocenter, latitude	deg	38.4655
Hypocenter, depth	deg	11.0933
Outputfine, 0=no, 1=yes	x	1
Model name	x	1B_EIF_

F.3 1C IF, Izmir Fault

The home directory for the earthquake scenario is c:\IZMIR\1C_IF\ and all references to directories are given from this directory.

F.3.1 General data

Table F.100: General data describing the earthquake scenario geometry and kinematic rupture parameters for the asperity and background.

General data	Unit	Values	Segment 1	Segment 2	Segment 3	
Length	km	x	18	3	21	
Strike	deg	x	263.31	249.66	257.20	
Dip	deg	x	60	60	60	
Rake	deg	x	-100	-100	-100	
Seismic moment	Nm	2.69E+19	x	x	x	
Moment magnitude	x	6.89	x	x	x	
Epicenter, longitude	deg E	27.2871	x	x	x	
Epicenter, latitude	deg N	38.4888	x	x	x	
Epicenter, depth	km	11.0933	x	x	x	
Model parameters	**Unit**	**Asp 1**	**Bg 1**	**Bg2**	**Asp 3**	**Bg 3**
Asperity width	km	6	15	15	6	15
Asperity length	km	9	18	3	12	21
Depth asperity	km	6.5	2	2	6.5	2
Strike	deg	263.31	263.31	249.66	257.20	257.20
Dip	deg	60	60	60	60	60
Rake	deg	-100	-100	-100	-100	-100
M_0, asperity	Nm	7.05E+17	2.31E+17	9.42E+16	8.14E+17	2.49E+17
Risetime	s	1	1	1	1	1
Rupture velocity	km/s	2.5	2.5	1	2.5	2.5
Stress drop	Bar	115.83	5.79	5.79	115.83	5.79
N^o subfaults	x	6	30	5	8	35
Q	x	82	82	82	82	82
f_{max}	x	10	10	10	10	10

F.3.2 Input to coord.f

Table F.21: Input parameters used in the FORTRAN™ program coord.f. Output directory is given from c:\IZMIR\1C_IF\coordinates.

Parameters	Units	Asp 1	Bg 1	Bg 2	Asp 3	Bg 3
Asperity number	x	1	2	3	4	5
Defining latitude	deg	38.4074	38.3826	38.4093	38.4482	38.4195
Defining longitude	deg	26.9443	26.8960	27.0976	27.1753	27.1307
Defining depth	m	7196	3299	3299	7196	3299
ds	m	3000	3000	3000	3000	3000
dw	m	3000	3000	3000	3000	3000
ulat	km/deg	111.2	111.2	111.2	111.2	111.2
ulong	km/deg	87.14	87.14	87.14	87.14	87.14
N^o subfault planes	x	1	1	1	1	1

Strike	deg	263.31	263.31	249.66	257.20	257.20
Dip	deg	60	60	60	60	60
ns	x	3	6	1	4	7
nw	x	2	5	5	2	5
iss	x	3	6	1	4	7
isw	x	1	1	1	1	1
Output directory	x	..\coord1. ***.out	..\coord2. ***.out	..\coord3. ***.out	..\coord4. ***.out	..\coord5. ***.out
Depth of station	m	0	0	0	0	0
N^o of stations	x	334	334	334	334	334
Reading order	x	1	1	1	1	1

F.3.3 Input to green.f

*Table F.22: Input parameters used by the FORTRAN™ program green.f. Coordinate directory is given from c:\IZMIR\2_GF\coordinates. Structure directory is c:\IZMIR\1C_IF\structure***.*

Parameters	**Asp 1**	**Bg 1**	**Bg 2**	**Asp 3**	**Bg 3**
ndatas	2	5	5	2	5
nstati	3	6	1	4	7
nw1	2	5	5	2	5
ns1 (nx1)	1	1	1	1	1
ns2 (nx2)	3	6	1	4	7
Output directory	..\green1\ ******.1	..\green2\ ******.2	..\green3\ ******.3	..\green4\ ******.4	..\green5\ ******.5
Coordinates directory	..\ coord1. **.out	..\ coord2. ***.out	..\ coord3. ***.out	..\ coord4. ***.out	..\ coord5. ***.out
N^o stations	334	334	334	334	334

F.3.4 Input to conv_risetime.f

Table F.211: Input parameters for the FORTTRAN™ program conv_risetime.f.

Parameters	**Units**	**Asp 1**	**Bg 1**	**Bg 2**	**Asp 3**	**Bg 3**
ics	x	5	5	5	5	5
Risetime	s	1	2	3	4	5
icc	x	3	3	3	3	3
nx	x	3	6	1	4	7
nw	x	2	5	5	2	5
N^o subfaults	x	1	1	1	1	1
nx1(1)	x	1	1	1	1	1
nx2(1)	x	3	6	1	4	7
nw1(1)	x	2	5	5	2	5
Strike	deg	263.31	263.31	249.66	257.20	257.20
Dip	deg	60	60	60	60	60
Rake	deg	-100	-100	-100	-100	-100
Masp/(nx*nw)	N*m	7.05E+17	2.31E+17	9.42E+16	8.14E+17	2.49E+17
nx*nw	x	6	30	5	8	35
Green's directory	x	..\green1\ ******.1	..\green2\ ******.2	..\green3\ ******.3	..\green4\ ******.4	..\green5\ ******.5
Output directory	x	..\conv1\ ******.1	..\conv2\ ******.2	..\conv3\ ******.3	..\conv4\ ******.4	..\conv5\ ******.5
N^o stations	x	334	334	334	334	334

F.3.5 Input to make_rad_pat.m

Table F.24: Input parameters used in the Matlab™ routine make_rad_pat.m.

Parameters	Units	Value	Asp 1	Bg 1	Bg 2	Asp 3	Bg 3
nsations	x	334	x	x	x	x	x
nasperity	x	2	x	x	x	x	x
Fr	Hz	1,5;2,5	x	x	x	x	x
Hypocenter, longitude	deg	27.2871	x	x	x	x	x
Hypocenter, latitude	deg	38.4888	x	x	x	x	x
Hypocenter, depth	m	11.0933	x	x	x	x	x
Model parameters							
Strike	deg	x	263.31	263.31	249.66	257.20	257.20
Dip	deg	x	60	60	60	60	60
Slip	deg	x	-100	-100	-100	-100	-100
Depth	km	x	6.5	2	2	6.5	2

F.3.6 Input for all_high_ori.m

Table F.25: Input parameters used in the Matlab™ routine all_high_ori.m.

Parameters	Units	Value	Asp 1	Bg 1	Bg 2	Asp 3	Bg 3
nstations	x	334	x	x	x	x	x
Nasperity	x	2	x	x	x	x	x
High freq. Directory	x	..\high	x	x	x	x	x
Hypocenter, longitude	deg	26.9242	x	x	x	x	x
Hypocenter, latitude	deg	38.4259	x	x	x	x	x
Hypocenter, depth	deg	11.0933	x	x	x	x	x
frad	Hz	1;1.5;2.5;3	x	x	x	x	x
Qfact		82	x	x	x	x	x
Qexp		1	x	x	x	x	x
fmax	Hz	x	10	10	10	10	10
fsur (usually=2)	x	x	2	2	2	2	2
fband	Hz	1.5;10	x	x	x	x	x
fstop	Hz	1;15	x	x	x	x	x
dt, sampling rate	s	0.03	x	x	x	x	x
DATA BOORE							
betav	km/s	x	3.621	3.621	3.621	3.621	3.621
row	g/cm3	x	2.66	2.66	2.66	2.66	2.66
sdp	bar	x	115.83	5.7915	5.7915	115.83	5.7915
smt	N*m	x	1.41E+17	4.61E+16	1.88E+16	1.63E+17	4.98E+16
DATA empirical Green's functions							
Strike	deg	x	263.31	263.31	249.66	257.1989	257.1989
Dip	deg	x	60	60	60	60	60
Slip	deg	x	-100	-100	-100	-100	-100
dxa	km	x	3	3	3	3	3
dwa	km	x	3	3	3	3	3
rt	s	x	1	1	1	1	1

d_rt	s	x	0.4	0.4	0.4	0.4	0.4
nxa	x	x	3	6	1	4	7
nwa	x	x	2	5	5	2	5
nta	x	x	5	5	5	5	5
vr	km/s	x	2.5	2.5	2.5	2.5	2.5
d_vr	km/s	x	0.5	0.5	0.5	0.5	0.5

F.3.7 Input for all_pga_pgv.m

Table F.26: Input parameters used in the Matlab™ routine all_pga_pgv.m.

Parameter	**Units**	**Values**
nsimu	x	334
Hypocenter, longitude	deg	27.2871
Hypocenter, latitude	deg	38.4888
Hypocenter, depth	deg	11.0933
Output	x	1

Table F.27: Input parameters used by the Matlab™ routines low.m and high.m.

Parameters	**Units**	**Asp 1**	**Bg 1**	**Bg 2**	**Asp 3**	**Bg 3**
Low.m						
fband	Hz	0.1;1.0	0.1;1.0	0.1;1.0	0.1;1.0	0.1;1.0
fstop	Hz	0.05;1.5	0.05;1.5	0.05;1.5	0.05;1.5	0.05;1.5
nx	x	3	6	1	4	7
nz	x	2	5	5	2	5
ls	m	3000	3000	3000	3000	3000
ld	m	3000	3000	3000	3000	3000
vro	km/s	2.5	2.5	2.5	2.5	2.5
vri	km/s	2.5	2.5	2.5	2.5	2.5
d_vri	km/s	0.5	0.5	0.5	0.5	0.5
High.m						
dt	s	0.03	0.03	0.03	0.03	0.03
dirname	x	..\high	..\high	..\high	..\high	..\high
fband	Hz	1.5;10	1.5;10	1.5;10	1.5;10	1.5;10
fstop	Hz	1;15	1;15	1;15	1;15	1;15
vro	m/s	2.5	2.5	2.5	2.5	2.5
ls	m	3000	3000	3000	3000	3000

F.3.8 Input for plot_onef.m

Table F.28: Input parameters for the Matlab™ routine plot_onef.m.

Parameter	Units	Values
Hypocenter, longitude	deg	27.2871
Hypocenter, latitude	deg	38.4888
Hypocenter, depth	deg	11.0933
Outputfine, 0=no, 1=yes	x	1
Model name	x	1C_IF_

F.4 2GF, Gülbahçe Fault

The home directory for the earthquake scenario is c:\IZMIR\2_GF\ and all references to directories are given from this directory.

F.4.1 General data

Table F.29: General data describing the earthquake scenario geometry and kinematic rupture parameters for the asperity and background.

General data	Unit	Values	Segment 1	Segment 2	Segment 3	
Length	km	x	20	5	20	
Strike	deg	x	180.54	210.61	173.17	
Dip	deg	x	80	80	80	
Rake	deg	x	-10	-10	-10	
Seismic moment	Nm	3.22E+19	x	x	x	
Moment magnitude	x	6.94	x	x	x	
Epicenter, longitude	deg E	26.6059	x	x	x	
Epicenter, latitude	deg N	38.1990	x	x	x	
Epicenter, depth	km	13.0791	x	x	x	
Model parameters	**Unit**	**Asp 1**	**Bg 1**	**Bg2**	**Asp 3**	**Bg 3**
Asperity width	km	7.5	15	15	7.5	7.5
Asperity length	km	10	20	5	10	20
Depth asperity	km	5.75	2	2	5.75	2
Strike	deg	180.54	180.54	210.61	173.17	173.17
Dip	deg	80	80	80	80	80
Rake	deg	-10	-10	-10	-10	-10
M_0, asperity	Nm	6.45E+18	9.10E+18	1.14E+18	6.45E+18	9.10E+18
Risetime	s	3	3	3	3	3
Rupture velocity	km/s	3	3	3	3	3
Stress drop	Bar	309.57	15.48	15.48	309.57	15.48
N^o subfaults	x	12	48	12	12	48
Q	x	82	82	82	82	82
f_{max}	x	10	10	10	10	10

F.4.2 Input to coord.f

Table F.12: Input parameters used in the FORTRAN™ program coord.f. Output directory is given from c:\IZMIR\2_GF\coordinates.

Parameters	Units	Asp 1	Bg 1	Bg 2	Asp 3	Bg 3
Asperity number	x	1	2	3	4	
Defining latitude	deg	38.2102	38.1202	38.3017	38.3410	38.3417
Defining longitude	deg	26.2102	26.6249	26.6295	26.6478	26.6552
Defining depth	m	6924	3231	3231	6924	3231
ds	m	2500	2500	2500	2500	2500
dw	m	2500	2500	2500	2500	2500
ulat	km/deg	111.2	111.2	111.2	111.2	111.2
ulong	km/deg	87.14	87.14	87.14	87.14	87.14
N^o subfault planes	x	1	1	1	1	1

Strike	deg	180.54	180.54	210.61	173.17	173.17
Dip	deg	80	80	80	80	80
ns	x	4	8	2	4	8
nw	x	3	6	6	3	6
iss	x	4	8	2	4	8
isw	x	1	1	1	1	1
Output directory	x	..\coord1. ***.out	..\coord2. ***.out	..\ coord3. ***.out	..\ coord4. ***.out	..\ coord5. ***.out
Depth of station	m	0	0	0	0	0
N^o of stations	x	334	334	334	334	334
Reading order	x	1	1	1	1	1

F.4.3 Input to green.f

*Table F.131: Input parameters used by the FORTRAN™ program green.f. Coordinate directory is given from c:\IZMIR\2_GF\coordinates. Structure directory is c:\IZMIR\2_GF\structure***.*

Parameters	Asp 1	Bg 1	Bg 2	Asp 3	Bg 3
ndatas	3	6	6	3	6
nstati	4	8	2	4	8
nw1	3	6	6	3	6
ns1 (nx1)	1	1	1	1	1
ns2 (nx2)	4	8	2	4	8
Output directory	..\green1\ ******.1	..\green2\ ******.2	..\green3\ ******.3	..\green4\ ******.4	..\green5\ ******.5
Coordinates directory	..\ coord1. **.out	..\ coord2. ***.out	..\ coord3. ***.out	..\ coord4. ***.out	..\ coord5. ***.out
N^o stations	334	334	334	334	334

F.4.4 Input to conv_risetime.f

Table F.14: Input parameters for the FORTTRAN™ program conv_risetime.f.

Parameters	Units	Asp 1	Bg 1	Bg 2	Asp 3	Bg 3
ics	x	5	5	5	5	5
Risetime	s	1	2	3	4	5
icc	x	3	3	3	3	3
Nx	x	4	8	2	4	8
Nw	x	3	6	6	3	6
N^o subfaults	x	1	1	1	1	1
nx1(1)	x	1	1	1	1	1
nx2(1)	x	4	8	2	4	8
nw1(1)	x	3	6	6	3	6
Strike	deg	180.54	180.54	210.61	173.17	173.17
Dip	deg	80	80	80	80	80
Rake	deg	-10	-10	-10	-10	-10
Masp/(nx*nw)	N*m	5.37E+17	1.90E+17	9.48E+16	5.37E+17	1.90E+17
nx*nw	x	12	48	12	12	48
Green's directory	x	..\green1\ ******.1	..\green2\ ******.2	..\green3\ ******.3	..\green4\ ******.4	..\green5\ ******.5
Output directory	x	..\conv1\ ******.1	..\conv2\ ******.2	..\conv3\ ******.3	..\conv4\ ******.4	..\conv5\ ******.5
N^o stations	x	334	334	334	334	334

F.4.5 Input to make_rad_pat.m

Table F.15: Input parameters used in the Matlab™ routine make_rad_pat.m.

Parameters	Units	Value	Asp 1	Bg 1	Bg 2	Asp 3	Bg 3
nsations	x	334	x	x	x	x	x
nasperity	x	2	x	x	x	x	x
fr	Hz	1,5;2,5	x	x	x	x	x
Hypocenter, longitude	deg	26.6059	x	x	x	x	x
Hypocenter, latitude	deg	38.1990	x	x	x	x	x
Hypocenter, depth	m	13.0791	x	x	x	x	x
Model parameters							
Strike	deg	x	180.54	180.54	210.61	173.17	173.17
Dip	deg	x	80	80	80	80	80
Slip	deg	x	-10	-10	-10	-10	-10
Depth	km	x	5.75	2	2	5.75	2

F.4.6 Input for all_high_ori.m

Table F.16: Input parameters used in the Matlab™ routine all_high_ori.m.

Parameters	Units	Value	Asp 1	Bg 1	Bg 2	Asp 3	Bg 3
nstations	x	334	x	x	x	x	x
nasperity	x	2	x	x	x	x	x
High freq. directory	x	..\high	x	x	x	x	x
Hypocenter, longitude	deg	26.6059	x	x	x	x	x
Hypocenter, latitude	deg	38.1990	x	x	x	x	x
Hypocenter, depth	deg	13.0791	x	x	x	x	x
frad	Hz	1;1.5;2.5;3	x	x	x	x	x
Qfact		82	x	x	x	x	x
Qexp		1	x	x	x	x	x
fmax	Hz	x	10	10	10	10	10
fsur (usually=2)	x	x	2	2	2	2	2
fband	Hz	1.5;10	x	x	x	x	x
fstop	Hz	1;15	x	x	x	x	x
dt, sampling rate	s	0.03	x	x	x	x	x
DATA BOORE							
betav	km/s	x	3.621	3.621	3.621	3.621	3.621
row	g/cm3	x	2.66	2.66	2.66	2.66	2.66
sdp	bar	x	309.57	15.48	15.48	309.57	15.48
smt	N*m	x	1.07E+17	3.79E+16	1.90E+16	1.07E+17	3.79E+16
DATA empirical Green's functions							
Strike	deg	x	180.54	180.54	210.61	173.17	173.17
Dip	deg	x	80	80	80	80	80
Slip	deg	x	-10	-10	-10	-10	-10
dxa	km	x	2.5	2.5	2.5	2.5	2.5
dwa	km	x	2.5	2.5	2.5	2.5	2.5
rt	s	x	3	3	3	3	3

d_rt	s	x	0.5	0.5	0.5	0.5	0.5
nxa	x	x	4	8	2	4	8
nwa	x	x	3	6	6	3	6
nta	x	x	5	5	5	5	5
vr	km/s	x	3	3	3	3	3
d_vr	km/s	x	0.5	0.5	0.5	0.5	0.5

F.4.7 Input for all_pga_pgv.m

Table F.17: Input parameters used in the Matlab™ routine all_pga_pgv.m.

Parameter	**Units**	**Values**
nsimu	x	334
Hypocenter, longitude	deg	26.6059
Hypocenter, latitude	deg	38.1990
Hypocenter, depth	deg	13.0791
Output	x	1

Table F.18: Input parameters used by the Matlab™ routines low.m and high.m.

Parameters	**Units**	**Asp 1**	**Bg 1**	**Bg 2**	**Asp 3**	**Bg 3**
Low.m						
fband	Hz	0.1;1.0	0.1;1.0	0.1;1.0	0.1;1.0	0.1;1.0
fstop	Hz	0.05;1.5	0.05;1.5	0.05;1.5	0.05;1.5	0.05;1.5
nx	x	4	8	2	4	8
nz	x	3	6	6	3	6
ls	m	2500	2500	2500	2500	2500
ld	m	2500	2500	2500	2500	2500
vro	km/s	3	3	3	3	3
vri	km/s	3	3	3	3	3
d_vri	km/s	0.5	0.5	0.5	0.5	0.5
High.m						
dt	s	0.03	0.03	0.03	0.03	0.03
dirname	x	..\high	..\high	..\high	..\high	..\high
fband	Hz	1.5;10	1.5;10	1.5;10	1.5;10	1.5;10
fstop	Hz	1;15	1;15	1;15	1;15	1;15
vro	m/s	3	3	3	3	3
ls	m	2500	2500	2500	2500	2500

F.4.8 Input for plot_onef.m

Table F.19: Input parameters for the Matlab™ routine plot_onef.m.

Parameter	Units	Values
Hypocenter, longitude	deg	26.6059
Hypocenter, latitude	deg	38.1990
Hypocenter, depth	deg	13.0791
Outputfine, 0=no, 1=yes	x	1
Model name	x	2_GF_

F.5 3 TF, Tuzla Fault

The home directory for the earthquake scenario is c:\IZMIR\3_TF\ and all references to directories are given from this directory.

F.5.1 General data

Table F.20: General data describing the earthquake scenario geometry and kinematic rupture parameters for the asperity and background.

General data	Unit	Values	Segment 1	Segment 2	Segment 3		
Length	km	x	20	5	20		
Strike	deg	x	28.81	62.56	43.57		
Dip	deg	x	80	80	80		
Rake	deg	x	-167	-167	-167		
Seismic moment	Nm	2.56E+19	x	x	x		
Moment magnitude	x	6.87	x	x	x		
Epicenter, longitude	deg E	26.8933	x	x	x		
Epicenter, latitude	deg N	38.0348	x	x	x		
Epicenter, depth	km	12.3405	x	x	x		
Model parameters	**Unit**	**Asp 1**	**Bg 1**	**Asp 2**	**Bg 2**	**Asp 3**	**Bg 3**
Asperity width	km	6	15	6	15	6	15
Asperity length	km	12	15	3	12	6	12
Depth asperity	km	6.5	2	6.5	2	6.5	2
Strike	deg	28.81	28.81	62.56	62.56	43.57	43.57
Dip	deg	80	80	80	80	80	80
Rake	deg	-167	-167	-167	-167	-167	-167
M_0, asperity	Nm	6.93E+18	6.32E+18	8.66E+17	4.52E+18	2.45E+18	4.52E+18
Risetime	s	3	3	3	3	3	3
Rupture velocity	km/s	3	3	3	3	3	3
Stress drop	Bar	305.17	15.26	305.17	15.26	305.17	15.26
N^o subfaults	x	8	25	2	20	4	20
Q	x	82	82	82	82	82	82
f_{max}	x	10	10	10	10	10	10

F.5.2 Input to coord.f

Table F.39: Input parameters used in the FORTRAN™ program coord.f. Output directory is given from c:\IZMIR\2_GF\coordinates.

Parameters	Units	Asp 1	Bg 1	Asp 2	Bg 2	Asp 3	Bg 3
Asperity number	x	1	2	3	4	5	6
Defining latitude	deg	38.0500	38.0416	38.1716	38.159237	38.23746	38.22276
Defining longitude	deg	26.8938	26.8776	27.001619	26.951655	27.09386	27.06363
Defining depth	m	7909	3477	7909	3477	7909	3477
ds	m	3000	3000	3000	3000	3000	3000
dw	m	3000	3000	3000	3000	3000	3000
ulat	km/deg	111.2	111.2	111.2	111.2	111.2	111.2
ulong	km/deg	87.14	87.14	87.14	87.14	87.14	87.14
N^o subfault planes	x	1	1	1	1	1	1

Strike	deg	28.81	28.81	62.56	62.56	43.57	43.57
Dip	deg	80	80	80	80	80	80
ns	x	4	5	1	4	2	4
nw	x	2	5	2	5	2	5
iss	x	1	1	1	1	1	1
isw	x	1	1	1	1	1	1
Output directory	x	..\coord1. ***.out	..\coord2. ***.out	..\ coord3. ***.out	..\ coord4. ***.out	..\ coord5. ***.out	..\ coord6. ***.out
Depth of station	m	0	0	0	0	0	0
N^o of stations	x	334	334	334	334	334	334
Reading order	x	1	1	1	1	1	1

F.4.3 Input to green.f

*Table F.21: Input parameters used by the FORTRAN™ program green.f. Coordinate directory is given from c:\IZMIR\2_GF\coordinates. Structure directory is c:\IZMIR\2_GF\structure***.*

Parameters	**Asp 1**	**Bg 1**	**Asp 2**	**Bg 2**	**Asp 3**	**Bg 3**
ndatas	2	5	2	5	2	5
nstati	4	5	1	4	2	4
nw1	2	5	2	5	2	5
ns1 (nx1)	1	1	1	1	1	1
ns2 (nx2)	4	5	1	4	2	4
Output directory	..\green1\ ******.1	..\green2\ ******.2	..\green3\ ******.3	..\green4\ ******.4	..\green5\ ******.5	..\green6\ ******.6
Coordinates directory	..\ coord1. **.out	..\ coord2. ***.out	..\ coord3. ***.out	..\ coord4. ***.out	..\ coord5. ***.out	..\ coord6. ***.out
N^o stations	334	334	334	334	334	334

F.5.4 Input to conv_risetime.f

Table F.22: Input parameters for the FORTTRAN™ program conv_risetime.f.

Parameters	**Units**	**Asp 1**	**Bg 1**	**Asp 2**	**Bg 2**	**Asp 3**	**Bg 3**
ics	x	5	5	5	5	5	5
Risetime	s	1	1	1	1	1	1
icc	x	3	3	3	3	3	3
nx	x	4	5	1	4	2	4
nw	x	2	5	2	5	2	5
N^o subfaults	x	1	1	1	1	1	1
nx1(1)	x	1	1	1	1	1	1
nx2(1)	x	4	5	1	4	2	4
nw1(1)	x	2	5	2	5	2	5
Strike	deg	28.81	28.81	62.56	62.56	43.57	43.57
Dip	deg	80	80	80	80	80	80
Rake	deg	-167	-167	-167	-167	-167	-167
Masp/(nx*nw)	N*m	8.66E+17	2.53E+17	4.33E+17	2.26E+17	6.12E+17	2.26E+17
nx*nw	x	8	25	2	20	4	20
Green's directory	x	..\green1\ ******.1	..\green2\ ******.2	..\green3\ ******.3	..\green4\ ******.4	..\green5\ ******.5	..\green6\ ******.6
Output directory	x	..\conv1\ ******.1	..\conv2\ ******.2	..\conv3\ ******.3	..\conv4\ ******.4	..\conv5\ ******.5	..\conv6\ ******.6
N^o stations	x	334	334	334	334	334	334

F.5.5 Input to make_rad_pat.m

Table F.23: Input parameters used in the Matlab™ routine make_rad_pat.m.

Parameters	Units	Value	Asp 1	Bg 1	Asp 2	Bg 2	Asp 3	Bg 3
nsations	x	334	x	x	x	x	x	x
nasperity	x	2	x	x	x	x	x	x
fr	Hz	1,5;2,5	x	x	x	x	x	x
Hypocenter, longitude	deg	26.8933	x	x	x	x	x	x
Hypocenter, latitude	deg	38.0348	x	x	x	x	x	x
Hypocenter, depth	m	12.3405	x	x	x	x	x	x
Model parameters								
Strike	deg	x	28.81	28.81	62.56	62.56	43.57	43.57
Dip	deg	x	80	80	80	80	80	80
Slip	deg	x	-167	-167	-167	-167	-167	-167
Depth	km	x	6.5	2	6.5	2	6.5	2

F.5.6 Input for all_high_ori.m

Table F.24: Input parameters used in the Matlab™ routine all_high_ori.m.

Parameters	Units	Value	Asp 1	Bg 1	Asp 2	Bg 2	Asp 3	Bg 3
nstations	x	334	x	x	x	x	x	x
nasperity	x	2	x	x	x	x	x	x
High freq. directory	x	..\high	x	x	x	x	x	x
Hypocenter, longitude	deg	26.8933	x	x	x	x	x	x
Hypocenter, latitude	deg	38.0348	x	x	x	x	x	x
Hypocenter, depth	deg	12.3405	x	x	x	x	x	x
Frad	Hz	1;1.5;2.5;3	x	x	x	x	x	x
Qfact		82	x	x	x	x	x	x
Qexp		1	x	x	x	x	x	x
Fmax	Hz	x	10	10	10	10	10	10
fsur (usually=2)	x	x	2	2	2	2	2	2
fband	Hz	1.5;10	x	x	x	x	x	x
Fstop	Hz	1;15	x	x	x	x	x	x
dt, sampling rate	s	0.03	x	x	x	x	x	x
DATA BOORE								
betav	km/s	x	3.621	3.621	3.621	3.621	3.621	3.621
row	g/cm3	x	2.66	2.66	2.66	2.66	2.66	2.66
sdp	bar	x	305.17	15.26	305.17	15.26	305.17	15.26
smt	N*m	x	1.73E+17	5.06E+16	8.66E+16	4.52E+16	1.22E+17	4.52E+16
DATA EGF's								
Strike	deg	x	28.81	28.81	62.56	62.56	43.57	43.57
Dip	deg	x	80	80	80	80	80	80
Slip	deg	x	-167	-167	-167	-167	-167	-167
dxa	km	x	3	3	3	3	3	3
dwa	km	x	3	3	3	3	3	3
rt	s	x	3	3	3	3	3	3
d_rt	s	x	0.5	0.5	0.5	0.5	0.5	0.5
nxa	x	x	4	5	1	4	2	4

nwa	x	x	2	5	2	5	2	5
nta	x	x	5	5	5	5	5	5
vr	km/s	x	3	3	3	3	3	3
d_vr	km/s	x	0.5	0.5	0.5	0.5	0.5	0.5

F.5.7 Input for all_pga_pgv.m

Table F.25: Input parameters used in the Matlab™ routine all_pga_pgv.m.

Parameter	**Units**	**Values**
nsimu	x	334
Hypocenter, longitude	deg	26.8933
Hypocenter, latitude	deg	38.0348
Hypocenter, depth	deg	12.3405
Output	x	1

Table F.26: Input parameters used by the Matlab™ routines low.m and high.m.

Parameters	**Units**	**Asp 1**	**Bg 1**	**Asp 2**	**Bg 2**	**Asp 3**	**Bg 3**
Low.m							
fband	Hz	0.1;1.0	0.1;1.0	0.1;1.0	0.1;1.0	0.1;1.0	0.1;1.0
fstop	Hz	0.05;1.5	0.05;1.5	0.05;1.5	0.05;1.5	0.05;1.5	0.05;1.5
nx	x	4	5	1	4	2	4
nz	x	2	5	2	5	2	5
ls	m	3000	3000	3000	3000	3000	3000
ld	m	3000	3000	3000	3000	3000	3000
vro	km/s	3	3	3	3	3	3
vri	km/s	3	3	3	3	3	3
d_vri	km/s	0.5	0.5	0.5	0.5	0.5	0.5
High.m							
dt	s	0.03	0.03	0.03	0.03	0.03	0.03
dirname	x	..\high	..\high	..`high	..\high	..\high	..\high
fband	Hz	1.5;10	1.5;10	1.5;10	1.5;10	1.5;10	1.5;10
fstop	Hz	1;15	1;15	1;15	1;15	1;15	1;15
vro	m/s	3	3	3	3	3	3
ls	m	3000	3000	3000	3000	3000	3000

F.5.8 Input for plot_onef.m

Table F.27: Input parameters for the Matlab™ routine plot_onef.m.

Parameter	Units	Values
Hypocenter, longitude	deg	26.8933
Hypocenter, latitude	deg	38.0348
Hypocenter, depth	deg	12.3405
Outputfine, 0=no, 1=yes	x	1
Model name	x	3_TF_

F.6 4 SF, Seferihisar Fault

The home directory for the earthquake scenario is c:\IZMIR\4_SF\ and all references to directories are given from this directory.

F.6.1 General data

Table F.28: General data describing the earthquake scenario geometry and kinematic rupture parameters for the asperity and background.

General data	**Unit**	**Value**	
Length	km	22.5	
Strike	deg	198.77	
Dip	deg	80	
Rake	deg	-149	
Seismic moment	Nm	1.06E+19	
Moment magnitude	x	6.62	
Epicenter, longitude	deg E	26.7897	
Epicenter, latitude	deg N	38.2178	
Epicenter, depth	km	12.5867	
Model parameters	**Unit**	**Asperity**	**Background**
Asperity width	km	7	15
Asperity length	km	10	22.5
Depth asperity	km	5.75	2
Strike	deg	198.77	198.77
Dip	deg	80	80
Rake	deg	-149	-149
M_0, asperity	Nm	4.24E+18	6.35E+18
Risetime	s	3	3
Rupture velocity	km/s	3	3
Stress drop	Bar	287.95	14.4
N^o subfaults	x	12	54
Q	x	82	82
f_{max}	x	10	10

F.6.2 Input to coord.f

Table F.29: Input parameters used in the FORTRAN™ program coord.f.

Parameters	**Units**	**Asperity**	**Background**
Asperity number	x	1	2
Defining latitude	deg	38,2256	38,1705
Defining longitude	deg	26,8052	26,7892
Defining depth	m	6924	3231
ds	m	2500	2500
dw	m	2500	2500
ulat (scale latitude)	km/deg	111,2	111,2
ulong (scale longitude)	km/deg	87,14	87,14
N^o subfault planes	x	1	1
Strike	deg	198,77	198,77

Dip	deg	80	80
ns	x	4	9
nw	x	3	6
iss	x	4	9
isw	x	1	1
Output directory	x	..\coordinates\ coord1.***.out	..\coordinates\ coord2.***.out
Depth of station	m	0	0
N^{o} of stations	x	334	334
Reading order	x	1	1

F.6.3 Input to green.f

Table F.49: Input parameters used by the FORTRAN™ program green.f.

Parameters	Asperity	Background
ndatas	3	6
nstati	4	9
nw1	3	6
ns1 (nx1)	1	1
ns2 (nx2)	4	9
Directory structure files	..\structure***	..\structure***
Output directory	..\green1******.1	..\green2******.2
Coordinates directory	..\coordinates\ coord1.***.out	..\coordinates\ coord2.***.out
N^{o} stations	334	334

F.6.4 Input to conv_risetime.f

Table F.30: Input parameters for the FORTTRAN™ program conv_risetime.f.

Parameters	Units	Asperity	Background
ics	x	5	5
Risetime	s	1	1
icc (1=dis.; 2=vel.; 3=acc.)	x	3	3
nx	x	4	9
nw	x	3	6
N^{o} subfaults (always 1)	x	1	1
nx1(1) (always 1)	x	1	1
nx2(1)	x	4	9
nw1(1)	x	3	6
Strike	deg	198.77	198.77
Dip	deg	80	80
Rake	deg	-149	-149
Masp/(nx*nw)	N*m	3.53E+17	1.18E+17
nx*nw	x	1	1
Green's directory	x	..\green1******.1	..\green2******.2
Output directory	x	..\conv1******.1	..\conv2******.2
N^{o} stations	x	5	5

F.6.5 Input to make_rad_pat.m

Table F.31: Input parameters used in the Matlab™ routine make_rad_pat.m.

Parameters	**Units**	**Value**	**Asperity**	**Background**
nsations	x	334	x	x
nasperity	x	2	x	x
fr	Hz	1,5;2,5	x	x
Hypocenter, longitude	deg	26.7897	x	x
Hypocenter, latitude	deg	38.2178	x	x
Hypocenter, depth	m	12.5867	x	x
Model parameters				
Strike	deg	x	198.77	198.77
Dip	deg	x	80	80
Slip	deg	x	-149	-149
Depth	km	x	5.75	2

F.6.6 Input for all_high_ori.m

Table F.32: Input parameters used in the Matlab™ routine all_high_ori.m.

Parameters	**Units**	**Value**	**Asperity**	**Background**
nstations	x	334	x	x
nasperity	x	2	x	x
High freq. directory	x	..\high	x	x
Hypocenter, longitude	deg	26.7897	x	x
Hypocenter, latitude	deg	38.2178	x	x
Hypocenter, depth	deg	12.5867	x	x
frad	Hz	1;1.5;2.5;3	x	x
Qfact		82	x	x
Qexp		1	x	x
fmax	Hz	x	10	10
fsur (usually=2)	x	x	2	2
fband	Hz	1.5;10	x	x
fstop	Hz	1;15	x	x
dt, sampling rate	s	0.03	x	x
DATA BOORE				
betav	km/s	x	3.621	3.621
row	g/cm3	x	2.66	2.66
sdp	bar	x	287.95	14.4
smt	N*m	x	7.06E+16	2.35E+16
DATA empirical Green's functions				
Strike	deg	x	198.77	198.77
Dip	deg	x	80	80
Slip	deg	x	-149	-149
dxa	km	x	2.5	2.5
dwa	km	x	2.5	2.5
rt	s	x	3	3
d_rt	s	x	0.5	0.5
nxa	x	x	4	9
nwa	x	x	3	6
nta	x	x	5	5
vr	km/s	x	3	3

d_vr	km/s	x	0.5	0.5

F.6.7 Input for all_pga_pgv.m

Table F.33: Input parameters used in the Matlab™ routine all_pga_pgv.m.

Parameter	**Units**	**Values**
nsimu	x	334
Hypocenter, longitude	deg	26.7897
Hypocenter, latitude	deg	38.2178
Hypocenter, depth	deg	12.5867
Output	x	1

Table F.34: Input parameters used by the Matlab™ routines low.m and high.m.

Parameters	**Units**	**Asperity**	**Background**
Low.m			
fband	Hz	0.1;1.0	0.1;1.0
fstop	Hz	0.05;1.5	0.05;1.5
nx	x	4	9
nz	x	3	6
ls	m	2500	2500
ld	m	2500	2500
vro	km/s	3	3
vri	km/s	3	3
d_vri	km/s	0.5	0.5
High.m			
dt	s	0.03	0.03
dirname	x	..\high	..\high
fband	Hz	1.5;10	1.5;10
fstop	Hz	1;15	1;15
vro	m/s	3	3
ls	m	2500	2500

F.6.8 Input for plot_onef.m

Table F.35: Input parameters for the Matlab™ routine plot_onef.m.

Parameter	Units	Values
Hypocenter, longitude	deg	26.7897
Hypocenter, latitude	deg	38.2178
Hypocenter, depth	deg	12.5867
Outputfine, 0=no, 1=yes	x	1
Model name	x	4_SF_

F.7 5A WMF, Western Manisa Fault segment

The home directory for the earthquake scenario is c:\IZMIR\5A_WMF\ and all references to directories are given from this directory.

F.7.1 General data

Table F.36: General data describing the earthquake scenario geometry and kinematic rupture parameters for the asperity and background.

General data	**Unit**	**Value**	
Length	km	18	
Strike	deg	276.07	
Dip	deg	48	
Rake	deg	-83	
Seismic moment	Nm	6.24E+18	
Moment magnitude	x	6.46	
Epicenter, longitude	deg E	27.4508	
Epicenter, latitude	deg N	38.6768	
Epicenter, depth	km	9.8030	
Model parameters	**Unit**	**Asperity**	**Background**
Asperity width	km	6	15
Asperity length	km	9	18
Depth asperity	km	6.5	2
Strike	deg	276.07	276.07
Dip	deg	48	48
Rake	deg	-83	-83
M_0, asperity	Nm	2.50E+18	3.74E+18
Risetime	s	1	1
Rupture velocity	km/s	2.5	2.5
Stress drop	Bar	115.83	5.79
N^o subfaults	x	6	30
Q	x	82	82
f_{max}	x	10	10

F.7.2 Input to coord.f

Table F.37: Input parameters used in the FORTRAN™ program coord.f.

Parameters	**Units**	**Asperity**	**Background**
Asperity number	x	1	2
Defining latitude	deg	38.6513	38.6201
Defining longitude	deg	27.4300	27.4777
Defining depth	m	6459	3115
ds	m	3000	3000
dw	m	3000	3000
ulat (scale latitude)	km/deg	111.2	111.2
ulong (scale longitude)	km/deg	87.14	87.14
N^o subfault planes	x	1	1
Strike	deg	276.07	276.07

Dip	deg	48	48
ns	x	3	6
nw	x	2	5
iss	x	1	1
isw	x	1	1
Output directory	x	..\coordinates\ coord1.***.out	..\coordinates\ coord2.***.out
Depth of station	m	0	0
N^o of stations	x	334	334
Reading order	x	1	1

F.7.3 Input to green.f

Table F.38: Input parameters used by the FORTRAN™ program green.f.

Parameters	Asperity	Background
ndatas	2	5
nstati	3	6
nw1	2	5
ns1 (nx1)	1	1
ns2 (nx2)	3	6
Directory structure files	..\structure***	..\structure***
Output directory	..\green1******.1	..\green2******.2
Coordinates directory	..\coordinates\ coord1.***.out	..\coordinates\ coord2.***.out
N^o stations	334	334

F.7.4 Input to conv_risetime.f

Table F.59: Input parameters for the FORTTRAN™ program conv_risetime.f.

Parameters	Units	Asperity	Background
ics	x	5	5
Risetime	s	1	1
icc (1=dis.; 2=vel.; 3=acc.)	x	3	3
nx	x	3	6
nw	x	2	5
N^o subfaults (always 1)	x	1	1
nx1(1) (always 1)	x	1	1
nNx2(1)	x	3	6
nw1(1)	x	2	5
Strike	deg	276.07	276.07
Dip	deg	48	48
Rake	deg	-83	-83
Masp/(nx*nw)	N*m	4.16E+17	1.25E+17
nx*nw	x	1	1
Green's directory	x	..\green1******.1	..\green2******.2
Output directory	x	..\conv1******.1	..\conv2******.2
N^o stations	x	5	5

F.7.5 Input to make_rad_pat.m

Table F.39: Input parameters used in the Matlab™ routine make_rad_pat.m.

Parameters	Units	Value	Asperity	Background
nsations	x	334	x	x
nasperity	x	2	x	x
fr	Hz	1,5;2,5	x	x
Hypocenter, longitude	deg	27.4508	x	x
Hypocenter, latitude	deg	38.6768	x	x
Hypocenter, depth	m	9.8030	x	x
Model parameters				
Strike	deg	x	276.07	276.07
Dip	deg	x	48	48
Slip	deg	x	-83	-83
Depth	km	x	6.5	2

F.7.6 Input for all_high_ori.m

Table F.40: Input parameters used in the Matlab™ routine all_high_ori.m.

Parameters	Units	Value	Asperity	Background
nstations	x	334	x	x
nasperity	x	2	x	x
High freq. directory	x	..\high	x	x
Hypocenter, longitude	deg	27.4508	x	x
Hypocenter, latitude	deg	38.6768	x	x
Hypocenter, depth	deg	9.8030	x	x
frad	Hz	1;1.5;2.5;3	x	x
Qfact		82	x	x
Qexp		1	x	x
fmax	Hz	x	10	10
fsur (usually=2)	x	x	2	2
fband	Hz	1.5;10	x	x
fstop	Hz	1;15	x	x
dt, sampling rate	s	0.03	x	x
DATA BOORE				
betav	km/s	x	3.621	3.621
row	g/cm3	x	2.66	2.66
sdp	bar	x	115.83	5.79
smt	N*m	x	8.32E+16	2.50E+16
DATA empirical Green's functions				
Strike	deg	x	276.07	276.07
Dip	deg	x	48	48
Slip	deg	x	-83	-83
dxa	km	x	3	3
dwa	km	x	3	3
rt	s	x	3	3
d_rt	s	x	0.5	0.5
nxa	x	x	3	6
nwa	x	x	2	5
nta	x	x	5	5
vr	km/s	x	3	3

d_vr	km/s	x	0.5	0.5

F.7.7 Input for all_pga_pgv.m

Table F.41: Input parameters used in the Matlab™ routine all_pga_pgv.m.

Parameter	**Units**	**Values**
nsimu	x	334
Hypocenter, longitude	deg	27.4508
Hypocenter, latitude	deg	38.6768
Hypocenter, depth	deg	9.8030
Output	x	1

Table F.42: Input parameters used by the Matlab™ routines low.m and high.m.

Parameters	**Units**	**Asperity**	**Background**
Low.m			
fband	Hz	0.1;1.0	0.1;1.0
fstop	Hz	0.05;1.5	0.05;1.5
nx	x	3	6
nz	x	2	5
ls	m	3000	3000
ld	m	3000	3000
vro	km/s	3	3
vri	km/s	3	3
d_vri	km/s	0.5	0.5
High.m			
dt	s	0.03	0.03
dirname	x	..\high	..\high
fband	Hz	1.5;10	1.5;10
fstop	Hz	1;15	1;15
vro	m/s	3	3
ls	m	3000	3000

F.7.8 Input for plot_onef.m

Table F.43: Input parameters for the Matlab™ routine plot_onef.m.

Parameter	Units	Values
Hypocenter, longitude	deg	27.4508
Hypocenter, latitude	deg	38.6768
Hypocenter, depth	deg	9.8030
Outputfine, 0=no, 1=yes	x	1
Model name	x	5A_WMF_

F.8 5B IMF, Intermediate Manisa Fault segment

The home directory for the earthquake scenario is c:\IZMIR\5B_IMF\ and all references to directories are given from this directory.

F.8.1 General data

Table F.44: General data describing the earthquake scenario geometry and kinematic rupture parameters for the asperity and background.

General data	**Unit**	**Value**	
Length	km	15	
Strike	deg	303.58	
Dip	deg	48	
Rake	deg	-83	
Seismic moment	Nm	4.53E+18	
Moment magnitude	x	6.37	
Epicenter, longitude	deg E	27.6437	
Epicenter, latitude	deg N	38.5850	
Epicenter, depth	km	9.4314	
Model parameters	**Unit**	**Asperity**	**Background**
Asperity width	km	5	15
Asperity length	km	10	15
Depth asperity	km	7	2
Strike	deg	303.58	303.58
Dip	deg	48	48
Rake	deg	-83	-83
M_0, asperity	Nm	1.81E+18	2.72E+18
Risetime	s	1	1
Rupture velocity	km/s	2.5	2.5
Stress drop	Bar	115.83	5.7915
N^o subfaults	x	8	36
Q	x	82	82
f_{max}	x	10	10

F.8.2 Input to coord.f

Table F.45: Input parameters used in the FORTRAN™ program coord.f.

Parameters	**Units**	**Asperity**	**Background**
Asperity number	x	1	2
Defining latitude	deg	38.5724	38.5349
Defining longitude	deg	27.6158	27.6185
Defining depth	m	6645	2929
ds	m	2500	2500
dw	m	2500	2500
ulat (scale latitude)	km/deg	111.2	111.2
ulong (scale longitude)	km/deg	87.14	87.14
N^o subfault planes	x	1	1
Strike	deg	303.58	303.58
Dip	deg	48	48
ns	x	4	6

nw	x	2	6
iss	x	1	1
isw	x	1	1
Output directory	x	..\coordinates\ coord1.***.out	..\coordinates\ coord2.***.out
Depth of station	m	0	0
N^{o} of stations	x	334	334
Reading order	x	1	1

F.8.3 Input to green.f

Table F.46: Input parameters used by the FORTRAN™ program green.f.

Parameters	**Asperity**	**Background**
ndatas	2	6
nstati	4	6
nw1	2	6
ns1 (nx1)	1	1
ns2 (nx2)	4	6
Directory structure files	..\structure***	..\structure***
Output directory	..\green1******.1	..\green2******.2
Coordinates directory	..\coordinates\ coord1.***.out	..\coordinates\ coord2.***.out
N^{o} stations	334	334

F.8.4 Input to conv_risetime.f

Table F.47: Input parameters for the FORTRAN™ program conv_risetime.f.

Parameters	**Units**	**Asperity**	**Background**
ics	x	5	5
Risetime	s	1	1
icc (1=dis.; 2=vel.; 3=acc.)	x	3	3
nx	x	4	6
nw	x	2	6
N^{o} subfaults (always 1)	x	1	1
nx1(1) (always 1)	x	1	1
nx2(1)	x	4	6
nw1(1)	x	2	6
Strike	deg	303.58	303.58
Dip	deg	48	48
Rake	deg	-83	-83
Masp/(nx*nw)	N*m	2,26E+17	7,55E+16
nx*nw	x	1	1
Green's directory	x	..\green1******.1	..\green2******.2
Output directory	x	..\conv1******.1	..\conv2******.2
N^{o} stations	x	334	334

F.8.5 Input to make_rad_pat.m

Table F.69: Input parameters used in the Matlab™ routine make_rad_pat.m.

Parameters	Units	Value	Asperity	Background
nsations	x	334	x	x
nasperity	x	2	x	x
fr	Hz	1,5;2,5	x	x
Hypocenter, longitude	deg	27.6437	x	x
Hypocenter, latitude	deg	38.5850	x	x
Hypocenter, depth	m	9.4314	x	x
Model parameters				
Strike	deg	x	303.58	303.58
Dip	deg	x	48	48
Slip	deg	x	-83	-83
Depth	km	x	7	2

F.8.6 Input for all_high_ori.m

Table F.48: Input parameters used in the Matlab™ routine all_high_ori.m.

Parameters	Units	Value	Asperity	Background
nstations	x	334	x	x
nasperity	x	2	x	x
High freq. directory	x	..\high	x	x
Hypocenter, longitude	deg	27.6437	x	x
Hypocenter, latitude	deg	38.5850	x	x
Hypocenter, depth	deg	9.4314	x	x
frad	Hz	1;1.5;2.5;3	x	x
Qfact		82	x	x
Qexp		1	x	x
fmax	Hz	x	10	10
fsur (usually=2)	x	x	2	2
fband	Hz	1.5;10	x	x
fstop	Hz	1;15	x	x
dt, sampling rate	s	0.03	x	x
DATA BOORE				
betav	km/s	x	3.621	3.621
row	g/cm3	x	2.66	2.66
sdp	bar	x	115.83	5.79
smt	N*m	x	4.53E+16	1.51E+16
DATA empirical Green's functions				
Strike	deg	x	303.58	303.58
Dip	deg	x	48	48
Slip	deg	x	-83	-83
dxa	km	x	2.5	2.5
dwa	km	x	2.5	2.5
rt	s	x	1	1
d_rt	s	x	4	6
nxa	x	x	2	6
nwa	x	x	5	5
nta	x	x	2.5	2.5
vr	km/s	x	2.5	2.5

d_vr	km/s	x	0.5	0.5

F.8.7 Input for all_pga_pgv.m

Table F.49: Input parameters used in the Matlab™ routine all_pga_pgv.m.

Parameter	Units	Values
nsimu	x	334
Hypocenter, longitude	deg	27.6437
Hypocenter, latitude	deg	38.5850
Hypocenter, depth	deg	9.4314
Output	x	1

Table F.50: Input parameters used by the Matlab™ routines low.m and high.m.

Parameters	Units	Asperity	Background
Low.m			
fband	Hz	0.1;1.0	0.1;1.0
fstop	Hz	0.05;1.5	0.05;1.5
nx	x	4	6
nz	x	2	6
ls	m	2500	2500
ld	m	2500	2500
vro	km/s	2.5	2.5
vri	km/s	2.5	2.5
d_vri	km/s	0.5	0.5
High.m			
dt	s	0.03	0.03
dirname	x	..\high	..\high
fband	Hz	1.5;10	1.5;10
fstop	Hz	1;15	1;15
vro	m/s	2.5	2.5
ls	m	2500	2500

F.8.8 Input for plot_onef.m

Table F.513: Input parameters for the Matlab™ routine plot_onef.m.

Parameter	Units	Values
Hypocenter, longitude	deg	27.6437
Hypocenter, latitude	deg	38.5850
Hypocenter, depth	deg	9.4314
Outputfine, 0=no, 1=yes	x	1
Model name	x	5B_IMF_

F.9 5C EMF, Eastern Manisa Fault segment

The home directory for the earthquake scenario is c:\IZMIR\5C_EMF\ and all references to directories are given from this directory.

F.9.1 General data

Table F.52: General data describing the earthquake scenario geometry and kinematic rupture parameters for the asperity and background.

General data	**Unit**	**Value**	
Length	km	22.5	
Strike	deg	277.39	
Dip	deg	48	
Rake	deg	-83	
Seismic moment	Nm	9.23E+18	
Moment magnitude	x	6.58	
Epicenter, longitude	deg E	27.9156	
Epicenter, latitude	deg N	38.5483	
Epicenter, depth	km	9.9888	
Model parameters	**Unit**	**Asperity**	**Background**
Asperity width	km	7	15
Asperity length	km	10	22.5
Depth asperity	km	5.75	2
Strike	deg	277.39	277.39
Dip	deg	48	48
Rake	deg	-83	-83
M_0, asperity	Nm	3.69E+18	5.54E+18
Risetime	s	1	1
Rupture velocity	km/s	2.5	2.5
Stress drop	Bar	115.83	5.7915
N^o subfaults	x	12	54
Q	x	82	82
f_{max}	x	10	10

F.9.2 Input to coord.f

Table F.53: Input parameters used in the FORTRAN™ program coord.f.

Parameters	**Units**	**Asperity**	**Background**
Asperity number	x	1	2
Defining latitude	deg	38.5154	38.4858
Defining longitude	deg	27,8957	27.9631
Defining depth	m	5716	2929
ds	m	2500	2500
dw	m	2500	2500
ulat (scale latitude)	km/deg	111.2	111.2
ulong (scale longitude)	km/deg	87.14	87.14
N^o subfault planes	x	1	1
Strike	deg	277.39	277.39

Dip	deg	48	48
ns	x	4	9
nw	x	3	6
iss	x	1	1
isw	x	1	1
Output directory	x	..\coordinates\coord1.***.out	..\coordinates\coord2.***.out
Depth of station	m	0	0
N° of stations	x	334	334
Reading order	x	1	1

F.9.3 Input to green.f

Table F.54: Input parameters used by the FORTRAN™ program green.f.

Parameters	**Asperity**	**Background**
ndatas	3	6
nstati	4	9
nw1	3	6
ns1 (nx1)	1	1
ns2 (nx2)	4	9
Directory structure files	..\structure***	..\structure***
Output directory	..\green1******.1	..\green2******.2
Coordinates directory	..\coordinates\coord1.***.out	..\coordinates\coord2.***.out
N° stations	334	334

F.9.4 Input to conv_risetime.f

Table F.55: Input parameters for the FORTRAN™ program conv_risetime.f.

Parameters	**Units**	**Asperity**	**Background**
ics	x	5	5
Risetime	s	1	1
icc (1=dis.; 2=vel.; 3=acc.)	x	3	3
nx	x	4	9
nw	x	3	6
N° subfaults (always 1)	x	1	1
nx1(1) (always 1)	x	1	1
nx2(1)	x	4	9
nw1(1)	x	3	6
Strike	deg	277.39	277.39
Dip	deg	48	48
Rake	deg	-83	-83
Masp/(nx*nw)	N*m	3.08E+17	1.03E+17
nx*nw	x	1	1
Green's directory	x	..\green1******.1	..\green2******.2
Output directory	x	..\conv1******.1	..\conv2******.2
N° stations	x	334	334

F.9.5 Input to make_rad_pat.m

Table F.56: Input parameters used in the Matlab™ routine make_rad_pat.m.

Parameters	Units	Value	Asperity	Background
nsations	x	334	x	x
nasperity	x	2	x	x
fr	Hz	1,5;2,5	x	x
Hypocenter, longitude	deg	27.9156	x	x
Hypocenter, latitude	deg	38.5483	x	x
Hypocenter, depth	m	9.9888	x	x
Model parameters				
Strike	deg	x	277.39	277.39
Dip	deg	x	48	48
Slip	deg	x	-83	-83
Depth	km	x	5.75	2

F.9.6 Input for all_high_ori.m

Table F.79: Input parameters used in the Matlab™ routine all_high_ori.m.

Parameters	Units	Value	Asperity	Background
nstations	x	334	x	x
nasperity	x	2	x	x
High freq. directory	x	..\high	x	x
Hypocenter, longitude	deg	27.9156	x	x
Hypocenter, latitude	deg	38.5483	x	x
Hypocenter, depth	deg	9.9888	x	x
frad	Hz	1;1.5;2.5;3	x	x
Qfact		82	x	x
Qexp		1	x	x
fmax	Hz	x	10	10
fsur (usually=2)	x	x	2	2
fband	Hz	1.5;10	x	x
fstop	Hz	1;15	x	x
dt, sampling rate	s	0.03	x	x
DATA BOORE				
betav	km/s	x	3.621	3.621
row	g/cm3	x	2.66	2.66
sdp	bar	x	115.83	5.79
smt	N*m	x	6.15E+16	2.05E+16
DATA empirical Green's functions				
Strike	deg	x	277.39	277.39
Dip	deg	x	48	48
Slip	deg	x	-83	-83
dxa	km	x	2.5	2.5
dwa	km	x	2.5	2.5
rt	s	x	1	1
d_rt	s	x	0.4	0.4
nxa	x	x	4	9
nwa	x	x	3	6
nta	x	x	5	5
vr	km/s	x	2.5	2.5

d_vr	km/s	x	0.5	0.5

F.9.7 Input for all_pga_pgv.m

Table F.57: Input parameters used in the Matlab™ routine all_pga_pgv.m.

Parameter	**Units**	**Values**
nsimu	x	334
Hypocenter, longitude	deg	27.9156
Hypocenter, latitude	deg	38.5483
Hypocenter, depth	deg	9.9888
Output	x	1

Table F.58: Input parameters used by the Matlab™ routines low.m and high.m.

Parameters	**Units**	**Asperity**	**Background**
Low.m			
fband	Hz	0.1;1.0	0.1;1.0
fstop	Hz	0.05;1.5	0.05;1.5
nx	x	4	9
nz	x	3	6
ls	m	2500	2500
ld	m	2500	2500
vro	km/s	2.5	2.5
vri	km/s	2.5	2.5
d_vri	km/s	0.5	0.5
High.m			
dt	s	0.03	0.03
dirname	x	..\high	..\high
fband	Hz	1.5;10	1.5;10
fstop	Hz	1;15	1;15
vro	m/s	2.5	2.5
ls	m	2500	2500

F.9.8 Input for plot_onef.m

Table F.59: Input parameters for the Matlab™ routine plot_onef.m.

Parameter	Units	Values
Hypocenter, longitude	deg	27.9156
Hypocenter, latitude	deg	38.5483
Hypocenter, depth	deg	9.9888
Outputfine, 0=no, 1=yes	x	1
Model name	x	5C_EMF_

G Attenuation Figures

In this appendix all the figures showing the comparison of the empirical attenuation relations for peak ground motion described in chapter 6.1.2 with the simulated values of peak ground acceleration and velocity with distance to the fault are given. For comments the reader is referred to the discussion in chapter 6.1.2.

G.1 1A WIF, Western Izmir Fault segment

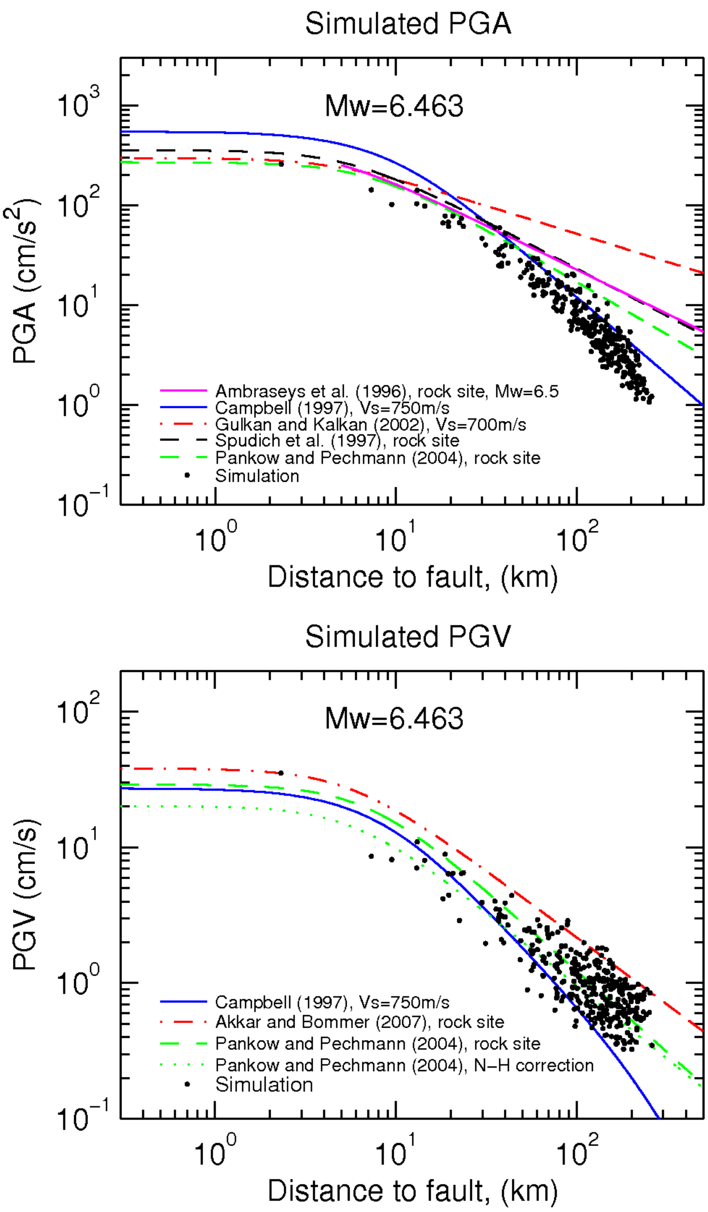
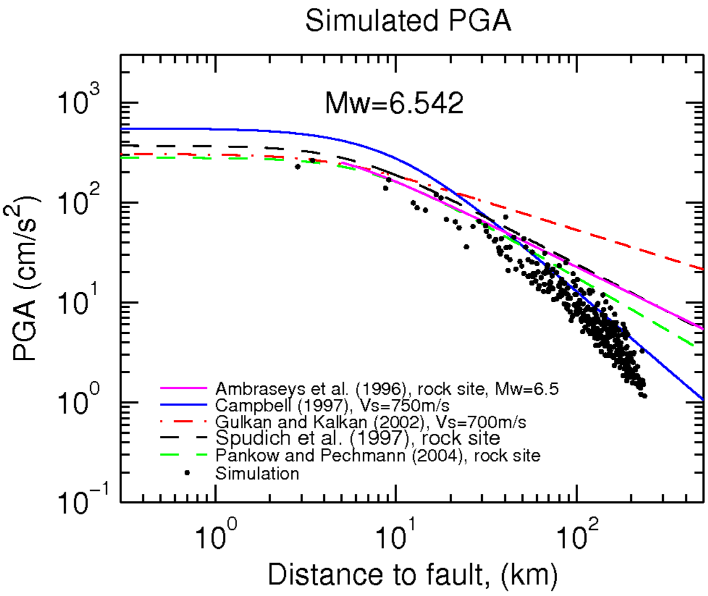


Figure G.1: The empirical attenuation relations described in chapter 6.1.2 compared to the results for peak ground motions in the case of scenario 1A WIF, Western Izmir Fault segment. Peak ground acceleration (top) and peak ground velocity (bottom).

G.2 1B EIF, Eastern Izmir Fault segment



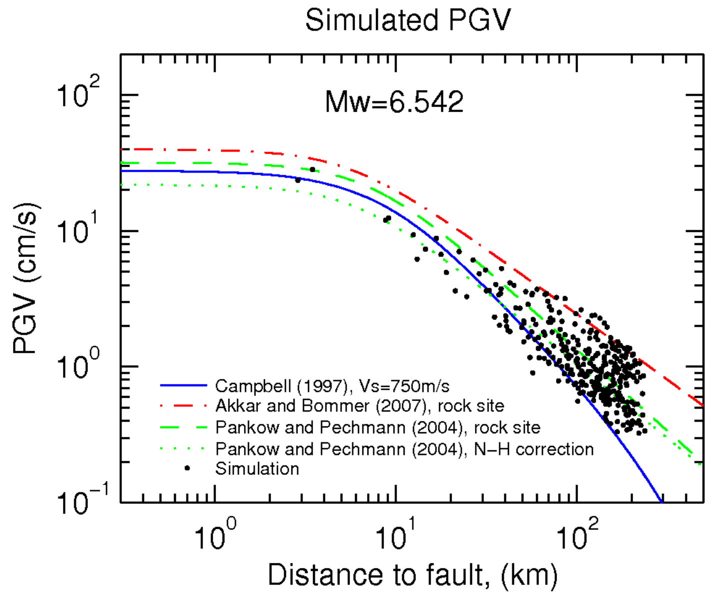


Figure G.2: The empirical attenuation relations described in chapter 6.1.2 compared to the results for peak ground motions in the case of scenario 1B EIF, Eastern Izmir Fault segment. Peak ground acceleration (top) and peak ground velocity (bottom).

G.3 1C IF, Izmir Fault

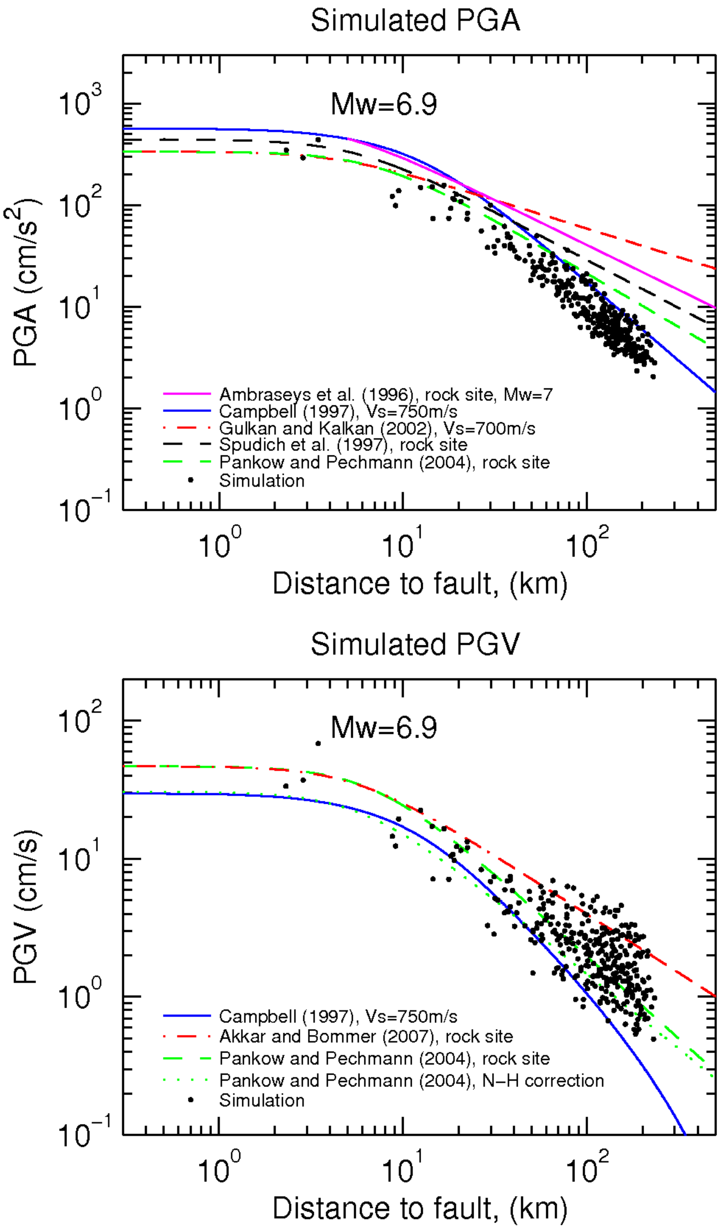


Figure G.3: The empirical attenuation relations described in chapter 6.1.2 compared to the results for peak ground motions in the case of scenario 1C IF, Izmir Fault. Peak ground acceleration (top) and peak ground velocity (bottom).

G.4 2 GF, Gulbahçe Fault

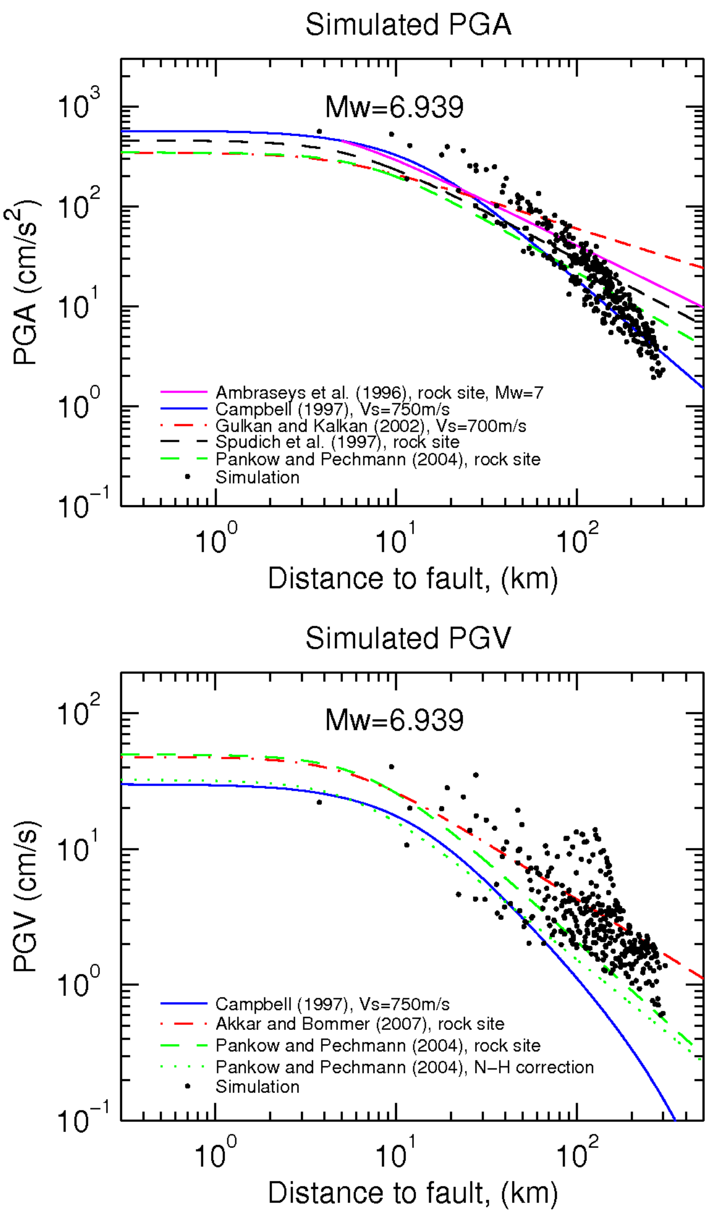


Figure G.4: The empirical attenuation relations described in chapter 6.1.2 compared to the results for peak ground motions in the case of scenario 2 GF, Gülbahçe Fault. Peak ground acceleration (top) and peak ground velocity (bottom).

G.5 3 TF, Tuzla Fault

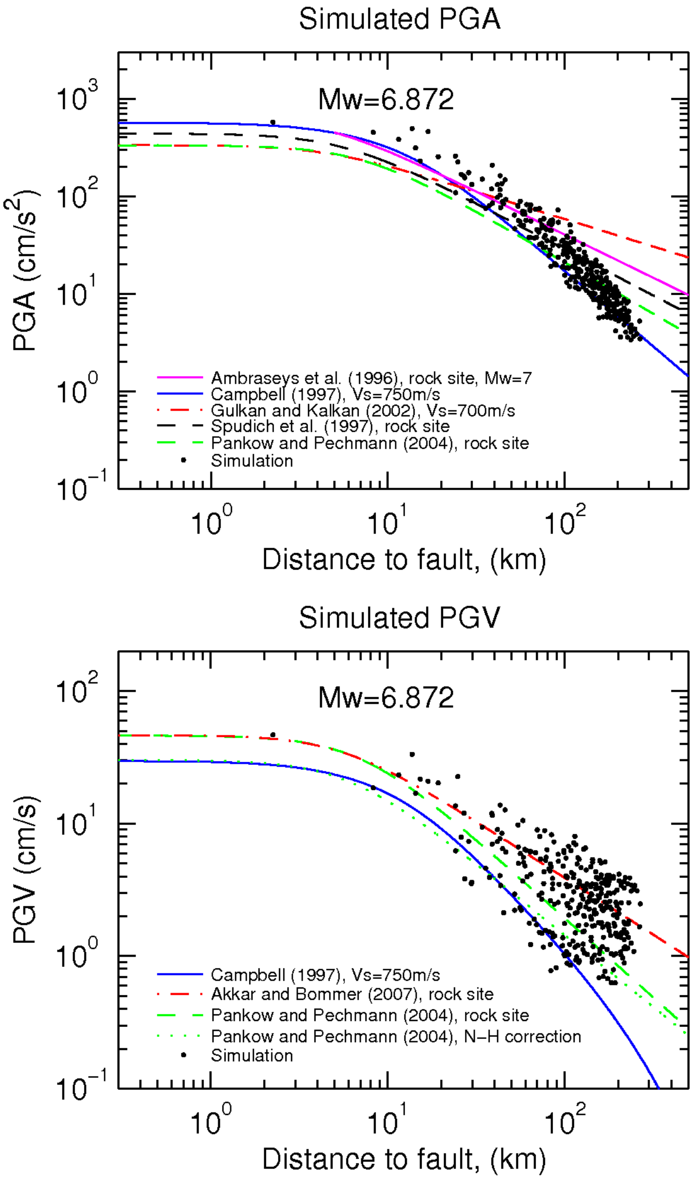
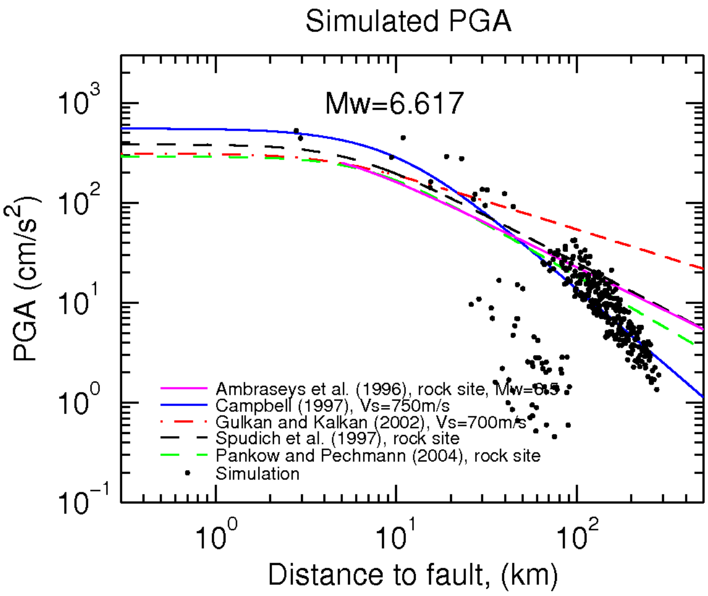


Figure G.5: The empirical attenuation relations described in chapter 6.1.2 compared to the results for peak ground motions in the case of scenario 3 TF, Tuzla Fault. Peak ground acceleration (top) and peak ground velocity (bottom).

G.6 4 SF, Seferihisar Fault



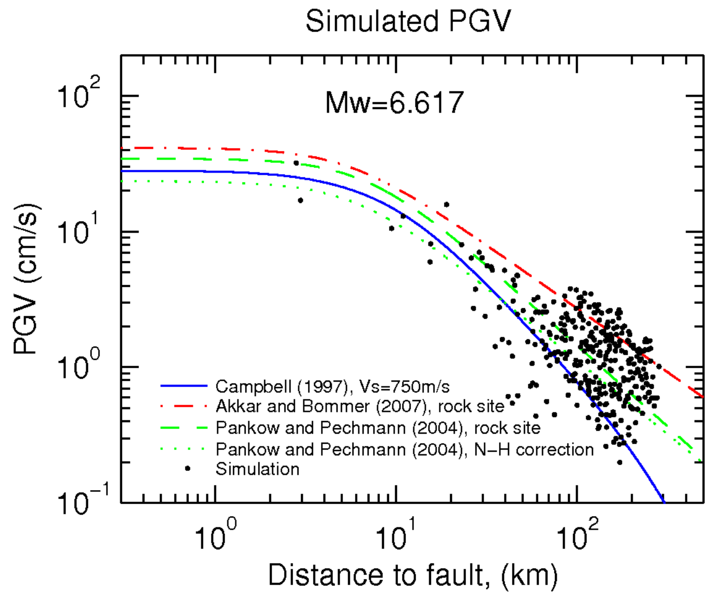


Figure G.6: The empirical attenuation relations described in chapter 6.1.2 compared to the results for peak ground motions in the case of scenario 4 SF, Seferihisar Fault. Peak ground acceleration (top) and peak ground velocity (bottom).

G.7 5A WMF, Western Manisa Fault segment

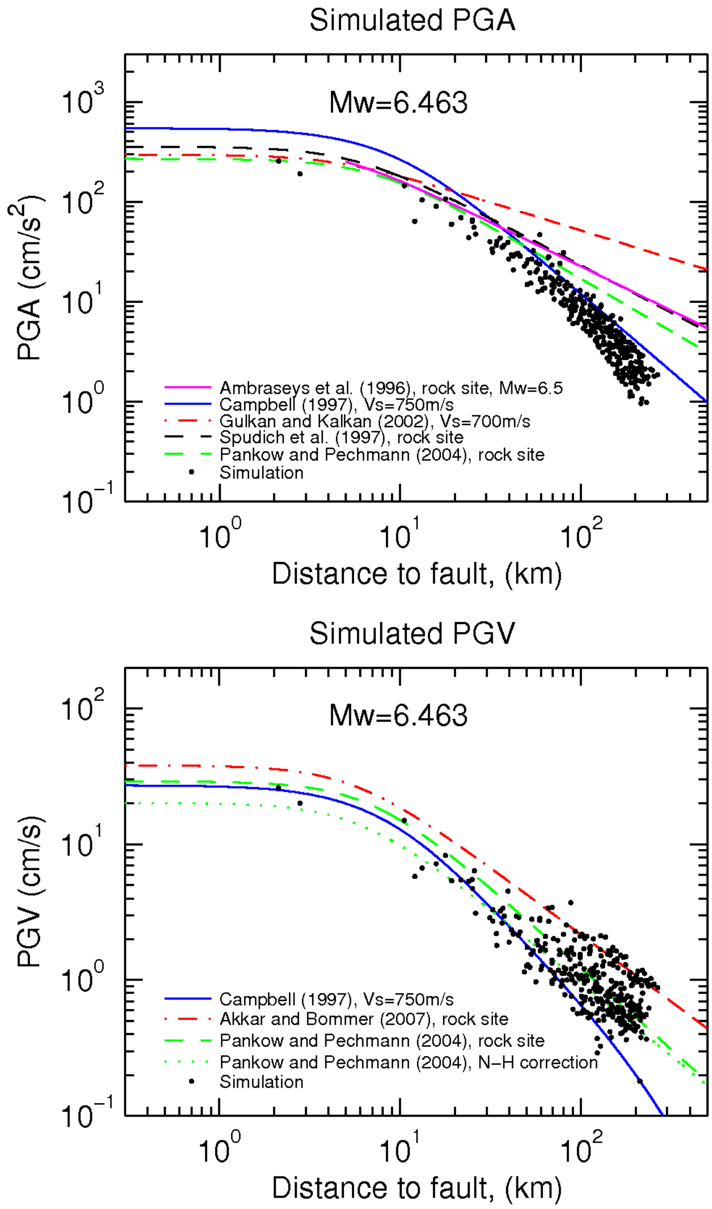


Figure G.7: The empirical attenuation relations described in chapter 6.1.2 compared to the results for peak ground motions in the case of scenario 5A WMF, Western Manisa Fault segment. Peak ground acceleration (top) and peak ground velocity (bottom).

G.8 5B IMF, Intermediate Manisa Fault segment

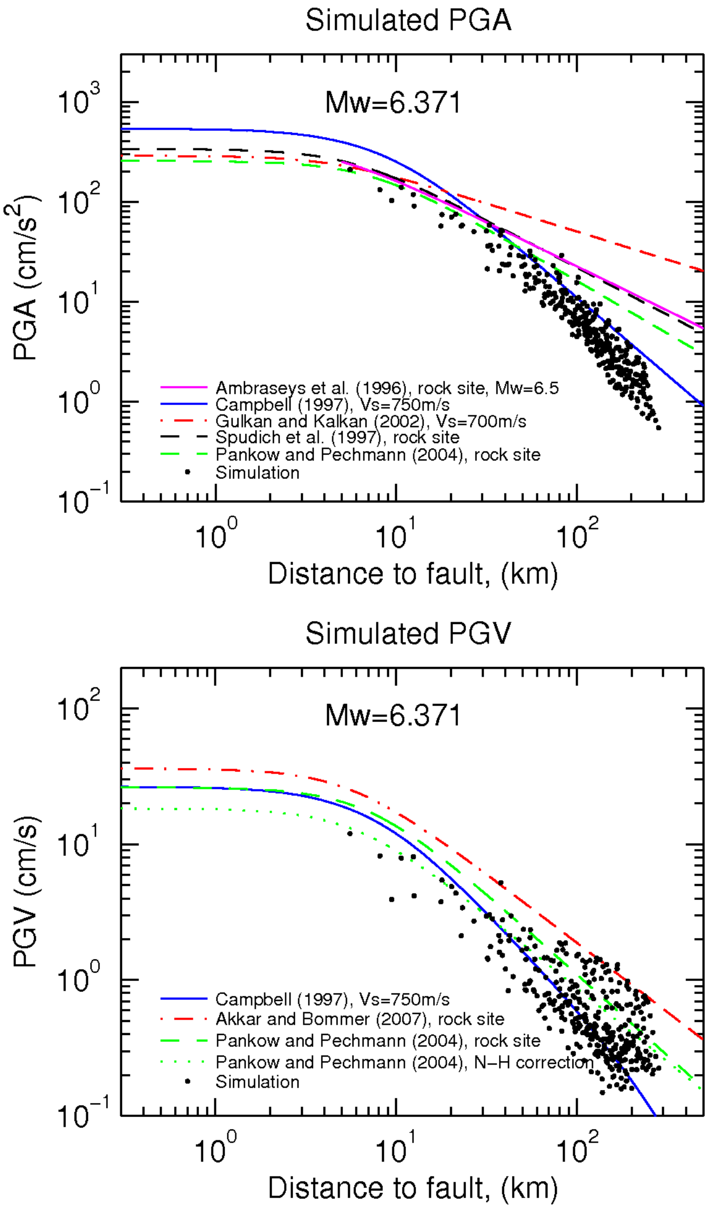


Figure G.8: The empirical attenuation relations described in chapter 6.1.2 compared to the results for peak ground motions in the case of scenario 5B IMF, Intermediate Manisa Fault segment. Peak ground acceleration (top) and peak ground velocity (bottom).

G.9 5C EMF, Eastern Manisa Fault segment

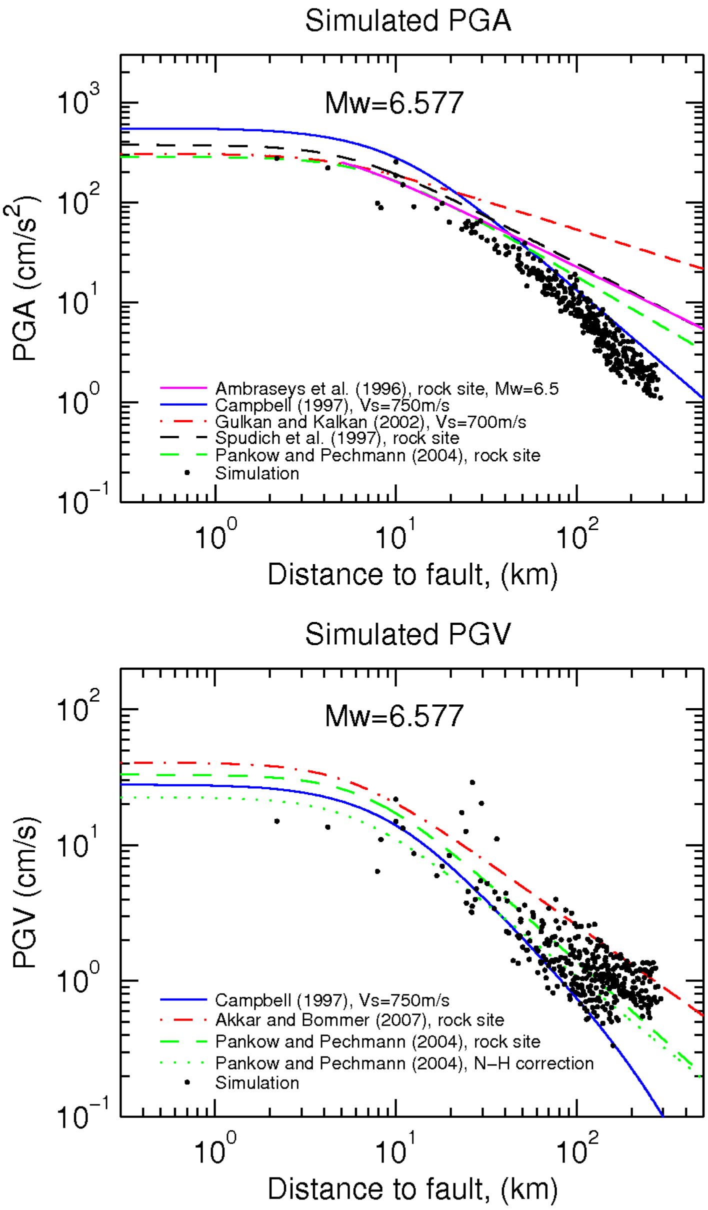


Figure G.9: The empirical attenuation relations described in chapter 6.1.2 compared to the results for peak ground motions in the case of scenario 5C EMF, Eastern Manisa Fault segment. Peak ground acceleration (top) and peak ground velocity (bottom).

H Velocity Response Spectra

In order to check if the program package used produces unrealistic high ground motions close to the fault, there is computed four velocity response spectra for the faults of Gülbahçe, Tuzla, Seferihisar and Manisa, corresponding to earthquake scenarios 2 GF, 3 TF, 4 SF and 5A WMF respectively. The velocity response is calculated for points located in a distance to the fault approximately corresponding the distance from the station located in Izmir to the Izmir fault. For discussion on these spectra see section 6.1.3.

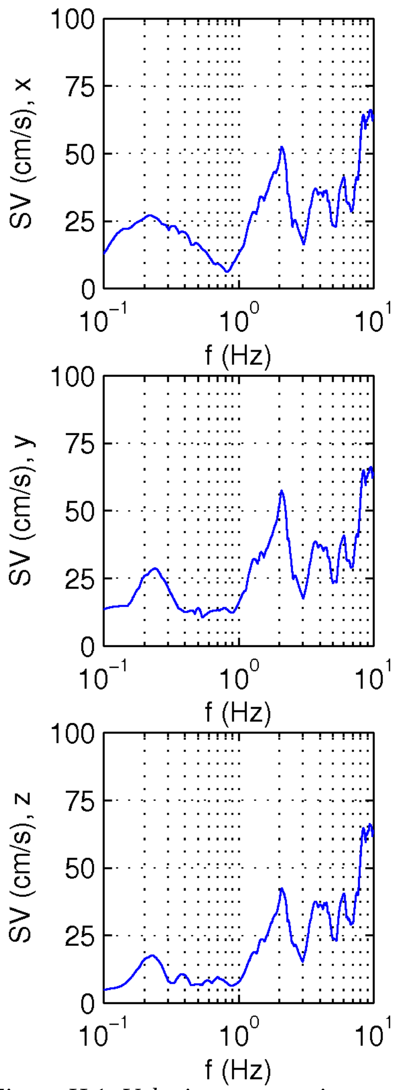


Figure H.1: Velocity response in a point located in 26.6E and 38.2N very close to Gülbahe fault, for a rupture on this fault.

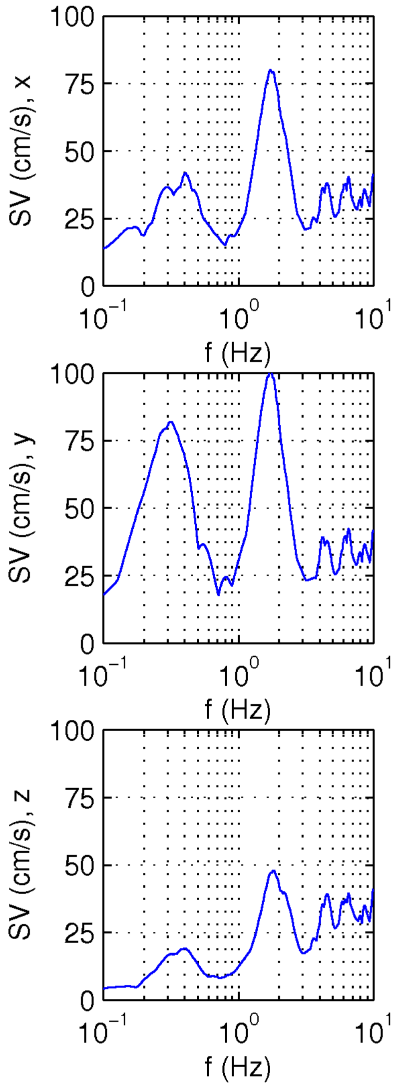


Figure H.2: Velocity response in a point located in 27.0E and 38.2N very close to Tuzla fault, for an earthquake rupture on this fault.

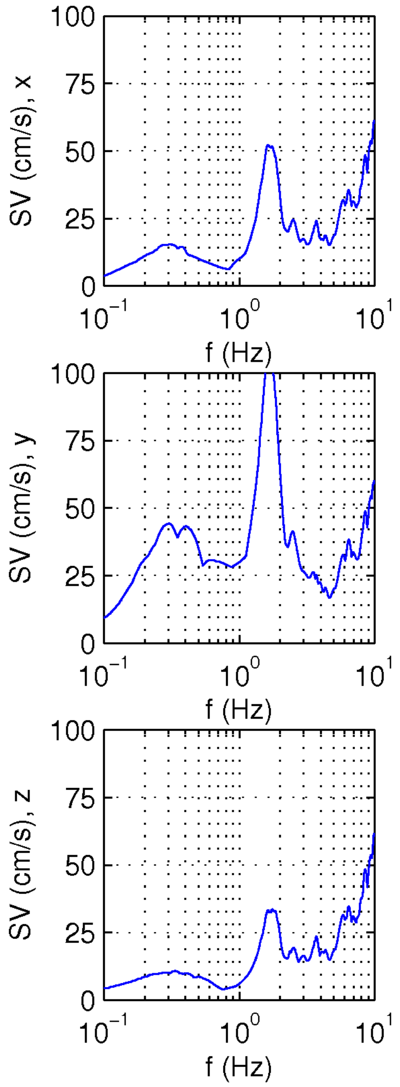


Figure H.3: Velocity response in a point located in 26.8E and 38.2N very close to Seferihisar fault, for an earthquake rupture on this fault.

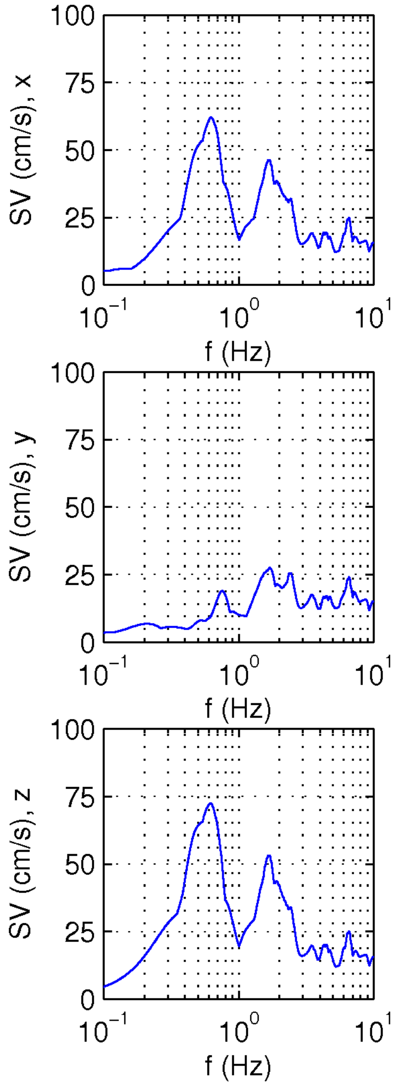


Figure H. 4: Velocity response in a point located in 27.4E and 38.6 N very close to Manisa fault, for an earthquake rupture on the western segment of the Manisa fault.