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LAMPIRAN



Lampiran A Perhitungan PGA Boore and Atkinson (2008)

$$\ln a = F_M(M) + F_D(R_{JB}, M) + F_S(V_{S30}, R_{JB}, M) + \varepsilon\sigma_T$$

untuk $M \leq M_h$

$$F_M(M) = e_1U + e_2SS + e_3NS + e_4RS + e_5(M - M_h) + e_6(M - M_h)^2$$

untuk $M \geq M_h$

$$F_M(M) = e_1U + e_2SS + e_3NS + e_4RS + e_7(M - M_h)$$

$$M_h = 6.5$$

Fault Type	U	SS	NS	RS
Unspecified	1	0	0	0
Strike-slip	0	1	0	0
Normal	0	0	1	0
Thrust/reverse	0	0	0	1



Period	e_1	e_2	e_3	e_4	e_5	e_6	e_7	M_h
PGV	5.00121	5.04727	4.63188	5.08210	0.18322	-0.12736	0.00000	8.50
PGA	-0.53804	-0.50350	-0.75472	-0.50970	0.28805	-0.10164	0.00000	6.75
0.010	-0.52883	-0.49429	-0.74551	-0.49966	0.28897	-0.10019	0.00000	6.75
0.020	-0.52192	-0.48508	-0.73906	-0.48895	0.25144	-0.11006	0.00000	6.75
0.030	-0.45285	-0.41831	-0.66722	-0.42229	0.17976	-0.12858	0.00000	6.75
0.050	-0.28476	-0.25022	-0.48462	-0.26092	0.06369	-0.15752	0.00000	6.75
0.075	0.00767	0.04912	-0.20578	0.02706	0.01170	-0.17051	0.00000	6.75
0.100	0.20109	0.23102	0.03058	0.22193	0.04697	-0.15948	0.00000	6.75
0.150	0.46128	0.48661	0.30185	0.49328	0.17990	-0.14539	0.00000	6.75
0.200	0.57180	0.59253	0.40860	0.61472	0.52729	-0.12964	0.00102	6.75
0.250	0.51884	0.53496	0.33880	0.57747	0.60880	-0.13843	0.08607	6.75
0.300	0.43825	0.44516	0.25356	0.51990	0.64472	-0.15694	0.10601	6.75
0.400	0.39220	0.40602	0.21398	0.46080	0.78610	-0.07843	0.02262	6.75
0.500	0.18957	0.19878	0.00967	0.26337	0.76837	-0.09054	0.00000	6.75
0.750	-0.21338	-0.19496	-0.49176	-0.10813	0.75179	-0.14053	0.10302	6.75
1.000	-0.46896	-0.43443	-0.78465	-0.39330	0.67880	-0.18257	0.05393	6.75
1.500	-0.86271	-0.79593	-1.20902	-0.88085	0.70689	-0.25950	0.19082	6.75
2.000	-1.22652	-1.15514	-1.57697	-1.27669	0.77989	-0.29657	0.29888	6.75
3.000	-1.82979	-1.74690	-2.22584	-1.91814	0.77966	-0.45384	0.67466	6.75
4.000	-2.24656	-2.15906	-2.58228	-2.38168	1.24961	-0.35874	0.79508	6.75
5.000	-1.28408	-1.21270	-1.50904	-1.41093	0.14271	-0.39006	0.00000	8.50
7.500	-1.43145	-1.31632	-1.81022	-1.59217	0.52407	-0.37578	0.00000	8.50
10.000	-2.15446	-2.16137	-2.53323	-2.14635	0.40387	-0.48492	0.00000	8.50

$$F_D(R_{JB}, M) = [c_1 + c_2(M - M_{Ref})] \ln (R/R_{Ref}) + c_3(R - R_{Ref})$$

$$R = \sqrt{R_{JB}^2 + h^2}$$

$$R_{Ref} = 1 \text{ km dan } M_{Ref} = 4.5$$



Period	c_1	c_2	c_3	h
PGV	-0.87370	0.10060	-0.00334	2.54
PGA	-0.66050	0.11970	-0.01151	1.35
0.010	-0.66220	0.12000	-0.01151	1.35
0.020	-0.66600	0.12280	-0.01151	1.35
0.030	-0.69010	0.12830	-0.01151	1.35
0.050	-0.71700	0.13170	-0.01151	1.35
0.075	-0.72050	0.12370	-0.01151	1.55
0.100	-0.70810	0.11170	-0.01151	1.68
0.150	-0.69610	0.09884	-0.01113	1.86
0.200	-0.58300	0.04273	-0.00952	1.98
0.250	-0.57260	0.02977	-0.00837	2.07
0.300	-0.55430	0.01955	-0.00750	2.14
0.400	-0.64430	0.04394	-0.00626	2.24
0.500	-0.69140	0.06080	-0.00540	2.32
0.750	-0.74080	0.07518	-0.00409	2.46
1.000	-0.81830	0.10270	-0.00334	2.54
1.500	-0.83030	0.09793	-0.00255	2.66
2.000	-0.82850	0.09432	-0.00217	2.73
3.000	-0.78440	0.07282	-0.00191	2.83
4.000	-0.68540	0.03758	-0.00191	2.89
5.000	-0.50960	-0.02391	-0.00191	2.93
7.500	-0.37240	-0.06568	-0.00191	3.00
10.000	-0.09824	-0.13800	-0.00191	3.04

$$F_S = F_{LIN} + F_{NL}$$



$$= b_{lin} \ln \left(\frac{V_{S30}}{V_{Ref}} \right)$$

Dimana $V_{ref} = 760 \text{ m/s}$

a) $pga_{4nl} \leq a_1$:

$$F_{NL} = b_{nl} \ln(pga_{low}/0.1)$$

b) $a_1 < pga_{4nl} \leq a_2$:

$$F_{NL} = b_{nl} \ln(pga_{low}/0.1) + c[\ln(pga_{4nl}/a_1)]^2 + d[\ln(pga_{4nl}/a_1)]^3$$

c) $a_2 < pga_{4nl}$:

$$F_{NL} = b_{nl} \ln(pga_{4nl}/0.1)$$

a) $V_{S30} \leq V_1$:

$$b_{nl} = b_1.$$

b) $V_1 < V_{S30} \leq V_2$:

$$b_{nl} = (b_1 - b_2) \ln(V_{S30}/V_2) / \ln(V_1/V_2) + b_2.$$

c) $V_2 < V_{S30} < V_{ref}$:

$$b_{nl} = b_2 \ln(V_{S30}/V_{ref}) / \ln(V_2/V_{ref}).$$

d) $V_{ref} \leq V_{S30}$:

$$b_{nl} = 0.0.$$



Period	b_{lin}	b_1	b_2
PGV	-0.600	-0.500	-0.06
PGA	-0.360	-0.640	-0.14
0.010	-0.360	-0.640	-0.14
0.020	-0.340	-0.630	-0.12
0.030	-0.330	-0.620	-0.11
0.050	-0.290	-0.640	-0.11
0.075	-0.230	-0.640	-0.11
0.100	-0.250	-0.600	-0.13
0.150	-0.280	-0.530	-0.18
0.200	-0.310	-0.520	-0.19
0.250	-0.390	-0.520	-0.16
0.300	-0.440	-0.520	-0.14
0.400	-0.500	-0.510	-0.10
0.500	-0.600	-0.500	-0.06
0.750	-0.690	-0.470	0.00
1.000	-0.700	-0.440	0.00
1.500	-0.720	-0.400	0.00
2.000	-0.730	-0.380	0.00
3.000	-0.740	-0.340	0.00
4.000	-0.750	-0.310	0.00
5.000	-0.750	-0.291	0.00
7.500	-0.692	-0.247	0.00
10.000	-0.650	-0.215	0.00



Coefficient	Value
a_1	0.03 g
pga_{low}	0.06 g
a_2	0.09 g
V_1	180 m/s
V_2	300 m/s
V_{ref}	760 m/s



Lampiran D Peta geologi dan Vs30 wilayah Sulawesi (Cipta, 2019)

