LAMPIRAN I

Hasil Perhitungan *Mode shape*

Tabel 1 Mode Shape Bangunan Reguler Arah X

Lantai	mode 1	mode 2	mode 3	mode 4	mode 5	mode 6	mode 7	mode 8	mode 9	mode 10	mode 11	mode 12	mode 13	mode 14	mode 15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2.362	2.274	2.103	1.855	1.543	1.182	0.786	0.376	-0.032	-0.420	-0.771	-1.072	-1.313	-1.487	-1.592
3	3.698	3.324	2.636	1.749	0.806	-0.045	-0.675	-0.999	-0.987	-0.667	-0.118	0.549	1.213	1.766	2.128
4	4.993	4.044	2.456	0.737	-0.601	-1.218	-1.065	-0.378	0.433	0.949	0.906	0.279	-0.732	-1.797	-2.589
5	6.233	4.364	1.612	-0.657	-1.508	-0.939	0.235	0.998	0.811	-0.086	-0.919	-0.951	0.021	1.578	2.961
6	7.404	4.252	0.331	-1.711	-1.164	0.459	1.162	0.380	-0.762	-0.881	0.145	1.096	0.696	-1.137	-3.228
7	8.492	3.720	-1.039	-1.878	0.146	1.310	0.245	-0.997	-0.502	0.785	0.752	-0.633	-1.195	0.538	3.383
8	9.487	2.819	-2.129	-1.072	1.335	0.600	-1.061	-0.382	0.966	0.258	-1.006	-0.182	1.318	0.137	-3.419
9	10.376	1.640	-2.642	0.289	1.416	-0.825	-0.683	0.997	0.110	-0.990	0.399	0.896	-1.027	-0.792	3.336
10	11.151	0.298	-2.440	1.501	0.322	-1.267	0.779	0.384	-1.010	0.527	0.550	-1.112	0.414	1.337	-3.136
11	11.801	-1.074	-1.578	1.935	-1.040	-0.199	1.005	-0.996	0.300	0.572	-1.028	0.712	0.330	-1.695	2.827
12	12.322	-2.339	-0.288	1.366	-1.538	1.106	-0.364	-0.387	0.889	-0.980	0.626	0.083	-0.970	1.815	-2.419
13	12.705	-3.373	1.079	0.090	-0.760	1.093	-1.155	0.995	-0.660	0.206	0.311	-0.833	1.305	-1.682	1.926
14	12.948	-4.072	2.154	-1.233	0.649	-0.223	-0.113	0.389	-0.621	0.817	-0.982	1.120	-1.230	1.313	-1.366
15	13.048	-4.373	2.652	-1.924	1.529	-1.284	1.122	-1.009	0.929	-0.872	0.832	-0.806	0.791	-0.783	0.781

Tabel 2 Mode Shape Bangunan SBV1 Arah X

Lantai	mode 1	mode 2	mode 3	mode 4	mode 5	mode 6	mode 7	mode 8	mode 9	mode 10	mode 11	mode 12	mode 13	mode 14	mode 15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2.360	2.262	2.109	1.894	1.572	1.172	0.759	0.427	0.061	-0.375	-0.784	-1.071	-1.220	-1.445	-1.603
3	3.688	3.271	2.659	1.882	0.884	-0.065	-0.707	-0.977	-1.019	-0.720	-0.092	0.546	0.943	1.629	2.167
4	6.212	4.542	2.358	0.078	-1.871	-2.351	-1.348	0.007	1.500	2.502	1.848	0.026	-1.475	-4.579	-7.395
5	8.653	5.310	1.436	-1.762	-3.138	-1.833	0.171	0.978	0.576	-1.101	-2.004	-0.583	1.367	6.570	12.228
6	10.979	5.490	0.138	-2.765	-1.909	0.871	1.416	0.059	-1.670	-1.700	0.425	0.801	-0.667	-7.186	-16.411
7	13.159	5.062	-1.197	-2.453	0.838	2.536	0.392	-0.974	-0.083	2.339	1.522	-0.553	-0.322	6.298	19.719
8	15.164	4.073	-2.217	-0.975	2.919	1.175	-1.260	-0.125	1.694	-0.002	-2.151	-0.016	1.172	-4.091	-21.976
9	16.968	2.633	-2.655	0.966	2.678	-1.587	-0.893	0.965	-0.418	-2.337	0.918	0.576	-1.514	1.028	23.063
10	18.546	0.901	-2.396	2.449	0.307	-2.457	0.905	0.190	-1.571	1.703	1.110	-0.801	1.199	2.250	-22.921
11	19.878	-0.931	-1.507	2.767	-2.308	-0.396	1.253	-0.952	0.882	1.098	-2.177	0.560	-0.365	-5.057	21.558
12	20.945	-2.659	-0.223	1.770	-3.087	2.137	-0.407	-0.255	1.310	-2.502	1.359	0.006	-0.627	6.806	-19.047
13	21.735	-4.093	1.120	-0.069	-1.411	2.121	-1.414	0.935	-1.269	0.723	0.635	-0.569	1.348	-7.130	15.521
14	22.235	-5.074	2.169	-1.875	1.387	-0.426	-0.155	0.318	-0.935	1.976	-2.079	0.801	-1.484	5.961	-11.168
15	22.442	-5.497	2.653	-2.799	3.101	-2.487	1.369	-0.927	1.572	-2.207	1.765	-0.582	1.004	-3.648	6.410

Tabel 3 Mode Shape Bangunan SBV2 Arah X

Lantai	mode 1	mode 2	mode 3	mode 4	mode 5	mode 6	mode 7	mode 8	mode 9	mode 10	mode 11	mode 12	mode 13	mode 14	mode 15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2.358	2.285	2.106	1.846	1.592	1.156	0.851	0.399	-0.021	-0.328	-0.793	-0.971	-1.297	-1.453	-1.570
3	3.678	3.367	2.651	1.720	0.941	-0.095	-0.593	-0.990	-0.992	-0.770	-0.076	0.306	1.165	1.653	2.050
4	4.942	4.151	2.488	0.688	-0.445	-1.230	-1.135	-0.424	0.412	0.868	0.881	0.560	-0.650	-1.566	-2.413
5	6.128	4.567	1.660	-0.707	-1.484	-0.868	0.051	0.979	0.829	0.162	-0.951	-1.059	-0.081	1.207	2.638
6	7.218	4.578	0.390	-1.729	-1.363	0.551	1.159	0.450	-0.739	-0.981	0.228	0.864	0.784	-0.638	-2.713
7	9.145	3.799	-2.321	-1.949	0.975	2.028	-0.136	-2.346	-0.342	1.993	1.130	-1.044	-3.188	0.538	7.836
8	10.931	2.686	-4.418	-1.149	2.558	1.055	-1.226	-0.544	0.868	-0.376	-1.520	0.514	4.454	-0.330	-12.284
9	12.547	1.337	-5.345	0.252	2.157	-1.193	-0.463	2.324	0.015	-1.736	0.606	0.365	-4.129	0.055	15.674
10	13.968	-0.129	-4.855	1.521	0.085	-1.999	0.999	0.637	-0.873	1.559	0.827	-0.996	2.331	0.231	-17.716
11	15.172	-1.585	-3.079	1.994	-2.054	-0.391	0.952	-2.299	0.314	0.675	-1.551	0.950	0.300	-0.471	18.232
12	16.141	-2.901	-0.488	1.425	-2.600	1.690	-0.533	-0.730	0.755	-2.018	0.945	-0.258	-2.824	0.615	-17.179
13	16.858	-3.962	2.233	0.110	-1.131	1.729	-1.213	2.269	-0.599	0.700	0.471	-0.610	4.339	-0.635	14.647
14	17.314	-4.674	4.362	-1.262	1.215	-0.321	-0.060	0.821	-0.529	1.541	-1.484	1.063	-4.306	0.527	-10.854
15	17.503	-4.978	5.346	-1.982	2.634	-2.001	1.197	-2.270	0.813	-1.786	1.254	-0.813	2.812	-0.322	6.312

Tabel 4 Mode Shape Bangunan SBV3 Arah X

Lantai	mode 1	mode 2	mode 3	mode 4	mode 5	mode 6	mode 7	mode 8	mode 9	mode 10	mode 11	mode 12	mode 13	mode 14	mode 15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2.358	2.284	2.108	1.844	1.595	1.161	0.846	0.413	-0.032	-0.315	-0.782	-0.983	-1.270	-1.479	-1.542
3	3.679	3.366	2.658	1.713	0.950	-0.086	-0.601	-0.984	-0.987	-0.783	-0.097	0.334	1.086	1.741	1.954
4	4.942	4.147	2.503	0.676	-0.435	-1.228	-1.129	-0.452	0.432	0.854	0.894	0.530	-0.515	-1.745	-2.201
5	6.129	4.560	1.686	-0.719	-1.481	-0.881	0.067	0.965	0.812	0.196	-0.935	-1.053	-0.240	1.493	2.263
6	7.220	4.567	0.421	-1.733	-1.375	0.535	1.161	0.491	-0.761	-0.989	0.186	0.899	0.910	-1.020	-2.133
7	8.198	4.168	-0.955	-1.832	-0.199	1.302	0.481	-0.946	-0.503	0.485	0.721	-0.167	-1.254	0.398	1.823
8	9.049	3.398	-2.078	-0.961	1.131	0.491	-0.934	-0.529	0.965	0.655	-1.018	-0.673	1.151	0.284	-1.360
9	9.759	2.326	-2.651	0.418	1.582	-0.916	-0.922	0.925	0.112	-0.936	0.455	1.080	-0.637	-0.923	0.781
10	10.859	-0.198	-2.394	2.702	0.043	-1.499	1.881	0.216	-2.103	0.889	0.529	-2.613	0.413	3.714	-1.030
11	11.790	-2.704	-1.508	3.568	-1.530	-0.278	1.831	-0.913	0.704	0.341	-1.054	2.401	-0.030	-5.852	1.163
12	12.540	-4.972	-0.225	2.561	-1.921	1.278	-0.996	-0.266	1.830	-1.117	0.663	-0.585	-0.364	6.962	-1.164
13	13.095	-6.800	1.117	0.209	-0.829	1.296	-2.313	0.899	-1.413	0.405	0.303	-1.622	0.618	-6.848	1.033
14	13.448	-8.028	2.165	-2.252	0.903	-0.246	-0.122	0.315	-1.282	0.846	-1.006	2.745	-0.635	5.531	-0.785
15	13.594	-8.553	2.649	-3.545	1.949	-1.505	2.279	-0.894	1.945	-0.991	0.856	-2.087	0.420	-3.337	0.461

Tabel 5 Mode Shape Bangunan SBV4 Arah X

Lantai	mode 1	mode 2	mode 3	mode 4	mode 5	mode 6	mode 7	mode 8	mode 9	mode 10	mode 11	mode 12	mode 13	mode 14	mode 15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2.360	2.262	2.108	1.896	1.579	1.181	0.764	0.422	0.073	-0.352	-0.761	-1.076	-1.216	-1.417	-1.573
3	3.689	3.273	2.657	1.888	0.903	-0.045	-0.702	-0.980	-1.022	-0.745	-0.137	0.558	0.933	1.537	2.061
4	4.969	3.919	2.501	0.979	-0.490	-1.218	-1.038	-0.469	0.233	0.892	0.916	0.267	-0.267	-1.335	-2.439
5	6.182	4.130	1.682	-0.397	-1.494	-0.939	0.296	0.957	0.952	0.097	-0.902	-0.945	-0.509	0.853	2.685
6	7.314	3.882	0.417	-1.583	-1.311	0.459	1.154	0.515	-0.519	-0.963	0.107	1.102	1.076	-0.192	-2.787
7	8.349	3.202	-0.959	-2.015	-0.086	1.310	0.155	-0.932	-0.797	0.601	0.781	-0.652	-1.201	-0.509	2.739
8	9.272	2.166	-2.080	-1.485	1.207	0.599	-1.093	-0.560	0.758	0.527	-0.993	-0.157	0.833	1.103	-2.544
9	10.073	0.889	-2.650	-0.247	1.541	-0.826	-0.582	0.905	0.569	-0.983	0.345	0.880	-0.123	-1.466	2.213
10	10.740	-0.486	-2.517	1.109	0.650	-1.267	0.866	0.603	-0.928	0.186	0.602	-1.118	-0.637	1.522	-1.762
11	11.264	-1.808	-1.717	1.936	-0.757	-0.198	0.920	-0.876	-0.291	0.848	-1.027	0.739	1.136	-1.259	1.216
12	11.639	-2.929	-0.461	1.840	-1.563	1.107	-0.507	-0.646	1.016	-0.802	0.563	0.047	-1.169	0.731	-0.605
13	12.074	-4.497	2.258	-0.082	-0.703	1.078	-1.713	2.296	-1.015	0.254	0.218	-1.637	2.561	-0.812	0.514
14	12.350	-5.569	4.383	-1.964	0.711	-0.227	-0.183	0.789	-0.728	0.622	-0.805	2.283	-2.834	0.700	-0.380
15	12.464	-6.032	5.364	-2.927	1.574	-1.274	1.659	-2.280	1.242	-0.707	0.693	-1.656	1.920	-0.433	0.220

Tabel 6 Mode Shape Bangunan Reguler Arah Y

Lantai	mode 1	mode 2	mode 3	mode 4	mode 5	mode 6	mode 7	mode 8	mode 9	mode 10	mode 11	mode 12	mode 13	mode 14	mode 15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2.915	2.825	2.648	2.394	2.074	1.702	1.297	0.877	0.461	0.068	-0.285	-0.584	-0.816	-0.974	-1.056
3	4.797	4.362	3.559	2.512	1.378	0.320	-0.519	-1.043	-1.215	-1.058	-0.655	-0.119	0.421	0.852	1.093
4	6.624	5.455	3.480	1.293	-0.493	-1.454	-1.490	-0.826	0.104	0.841	1.078	0.763	0.082	-0.645	-1.110
5	8.376	5.993	2.432	-0.616	-1.943	-1.448	-0.033	1.084	1.166	0.337	-0.652	-1.033	-0.564	0.374	1.108
6	10.032	5.921	0.707	-2.196	-1.736	0.330	1.477	0.772	-0.647	-1.130	-0.288	0.797	0.900	-0.066	-1.086
7	11.574	5.246	-1.215	-2.607	-0.048	1.704	0.581	-1.122	-0.865	0.633	1.001	-0.171	-1.005	-0.249	1.045
8	12.984	4.038	-2.798	-1.629	1.681	0.992	-1.262	-0.717	1.049	0.586	-0.925	-0.540	0.851	0.539	-0.985
9	14.246	2.418	-3.603	0.217	1.976	-0.935	-1.049	1.158	0.377	-1.136	0.119	0.985	-0.477	-0.775	0.908
10	15.345	0.552	-3.405	1.947	0.586	-1.717	0.873	0.660	-1.225	0.389	0.780	-0.949	-0.019	0.935	-0.815
11	16.270	-1.370	-2.259	2.640	-1.304	-0.397	1.372	-1.190	0.193	0.802	-1.065	0.447	0.511	-1.001	0.707
12	17.009	-3.153	-0.485	1.927	-2.082	1.409	-0.365	-0.601	1.135	-1.078	0.510	0.274	-0.871	0.969	-0.587
13	17.554	-4.614	1.424	0.187	-1.084	1.490	-1.508	1.220	-0.721	0.123	0.447	-0.860	1.006	-0.840	0.456
14	17.900	-5.606	2.937	-1.652	0.839	-0.253	-0.194	0.540	-0.800	0.972	-1.052	1.025	-0.882	0.627	-0.317
15	18.043	-6.033	3.642	-2.624	2.063	-1.706	1.458	-1.271	1.119	-0.984	0.852	-0.711	0.551	-0.366	0.179

Tabel 7 Mode Shape Bangunan SBV1Arah Y

Lantai	mode 1	mode 2	mode 3	mode 4	mode 5	mode 6	mode 7	mode 8	mode 9	mode 10	mode 11	mode 12	mode 13	mode 14	mode 15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2.912	2.807	2.638	2.408	2.066	1.638	1.185	0.806	0.441	-0.008	-0.444	-0.768	-0.890	-1.128	-1.297
3	4.783	4.276	3.514	2.566	1.354	0.166	-0.694	-1.097	-1.214	-0.992	-0.392	0.300	0.617	1.317	1.884
4	8.130	6.052	3.257	0.386	-2.132	-2.965	-1.938	-0.310	1.318	2.588	2.157	0.223	-0.959	-4.060	-6.987
5	11.369	7.150	2.122	-1.981	-3.904	-2.526	-0.028	1.092	0.789	-0.928	-2.087	-0.624	0.885	5.943	11.714
6	14.455	7.445	0.414	-3.387	-2.537	0.954	1.927	0.330	-1.572	-1.900	0.240	0.683	-0.426	-6.566	-15.810
7	17.349	6.906	-1.405	-3.151	0.871	3.286	0.746	-1.085	-0.282	2.338	1.811	-0.367	-0.217	5.798	19.055
8	20.011	5.592	-2.846	-1.387	3.578	1.662	-1.650	-0.350	1.663	0.166	-2.321	-0.150	0.766	-3.802	-21.274
9	22.407	3.651	-3.519	1.050	3.408	-1.962	-1.360	1.079	-0.255	-2.460	0.855	0.585	-0.983	0.999	22.347
10	24.503	1.300	-3.243	2.977	0.498	-3.225	1.143	0.370	-1.581	1.660	1.338	-0.699	0.773	2.015	-22.217
11	26.271	-1.196	-2.092	3.461	-2.812	-0.605	1.786	-1.072	0.765	1.229	-2.393	0.429	-0.228	-4.602	20.890
12	27.690	-3.558	-0.377	2.266	-3.861	2.743	-0.477	-0.390	1.334	-2.572	1.410	0.076	-0.416	6.214	-18.439
13	28.738	-5.521	1.440	-0.027	-1.806	2.789	-1.964	1.065	-1.195	0.679	0.772	-0.539	0.880	-6.509	14.995
14	29.403	-6.865	2.868	-2.307	1.702	-0.523	-0.254	0.410	-0.949	2.068	-2.298	0.707	-0.962	5.425	-10.743
15	29.679	-7.447	3.532	-3.485	3.870	-3.242	1.898	-1.077	1.535	-2.272	1.924	-0.503	0.648	-3.309	6.141

Tabel 8 Mode Shape Bangunan SBV2 Arah Y

Lantai	mode 1	mode 2	mode 3	mode 4	mode 5	mode 6	mode 7	mode 8	mode 9	mode 10	mode 11	mode 12	mode 13	mode 14	mode 15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2.910	2.831	2.642	2.365	2.092	1.631	1.303	0.825	0.384	0.055	-0.425	-0.599	-0.958	-1.012	-1.259
3	4.772	4.394	3.532	2.402	1.439	0.149	-0.509	-1.084	-1.208	-1.048	-0.425	-0.086	0.805	0.961	1.753
4	6.556	5.539	3.416	1.090	-0.415	-1.526	-1.495	-0.715	0.271	0.858	1.000	0.731	-0.559	-0.851	-2.573
5	8.231	6.157	2.328	-0.834	-1.922	-1.224	-0.055	1.157	1.061	0.301	-0.926	-1.028	0.248	0.688	3.872
6	9.771	6.190	0.578	-2.290	-1.827	0.664	1.475	0.597	-0.847	-1.120	0.252	0.838	0.091	-0.483	-5.890
7	12.332	5.159	-2.979	-2.605	1.181	2.572	-0.130	-2.772	-0.392	2.213	0.871	-1.183	-0.858	0.875	21.772
8	14.703	3.670	-5.743	-1.553	3.268	1.366	-1.537	-0.698	0.994	-0.390	-1.238	0.692	1.307	-0.987	-35.716
9	16.848	1.855	-6.980	0.313	2.808	-1.494	-0.613	2.747	0.019	-1.946	0.529	0.287	-1.271	0.782	46.481
10	18.734	-0.125	-6.361	2.015	0.159	-2.545	1.241	0.797	-1.001	1.718	0.639	-1.064	0.764	-0.327	-53.110
11	20.331	-2.094	-4.050	2.660	-2.614	-0.515	1.213	-2.718	0.357	0.774	-1.253	1.089	0.027	-0.233	55.012
12	21.615	-3.877	-0.662	1.909	-3.350	2.138	-0.654	-0.896	0.867	-2.246	0.778	-0.346	-0.807	0.719	-52.019
13	22.567	-5.315	2.902	0.156	-1.475	2.203	-1.530	2.685	-0.682	0.759	0.372	-0.642	1.288	-0.974	44.396
14	23.172	-6.282	5.695	-1.678	1.550	-0.399	-0.085	0.994	-0.611	1.728	-1.199	1.176	-1.292	0.917	-32.822
15	23.423	-6.696	6.990	-2.646	3.391	-2.547	1.510	-2.699	0.933	-1.989	1.015	-0.908	0.845	-0.586	19.028

Tabel 9 Mode Shape Bangunan SBV3 Arah Y

Lantai	mode 1	mode 2	mode 3	mode 4	mode 5	mode 6	mode 7	mode 8	mode 9	mode 10	mode 11	mode 12	mode 13	mode 14	mode 15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2.910	2.832	2.648	2.369	2.106	1.653	1.311	0.874	0.390	0.109	-0.358	-0.616	-0.821	-1.031	-1.169
3	4.774	4.397	3.558	2.415	1.485	0.202	-0.496	-1.046	-1.209	-1.089	-0.541	-0.049	0.436	1.017	1.451
4	6.559	5.546	3.478	1.115	-0.355	-1.507	-1.502	-0.819	0.258	0.781	1.052	0.692	0.060	-0.960	-1.872
5	8.239	6.172	2.428	-0.808	-1.903	-1.297	-0.082	1.089	1.071	0.452	-0.810	-1.019	-0.540	0.863	2.472
6	9.785	6.215	0.702	-2.280	-1.890	0.564	1.470	0.761	-0.832	-1.150	-0.012	0.879	0.885	-0.728	-3.310
7	11.173	5.671	-1.219	-2.480	-0.327	1.707	0.647	-1.129	-0.625	0.488	0.825	-0.338	-1.006	0.562	4.465
8	12.380	4.592	-2.801	-1.295	1.505	0.676	-1.221	-0.701	1.167	0.751	-1.048	-0.358	0.873	-0.372	-6.048
9	13.386	3.079	-3.603	0.612	2.102	-1.215	-1.117	1.166	-0.001	-1.102	0.520	0.890	-0.521	0.166	8.212
10	14.852	-0.271	-3.228	3.519	0.009	-1.855	2.428	0.189	-2.166	1.221	0.260	-2.649	0.515	-0.055	-27.770
11	16.093	-3.596	-2.013	4.592	-2.091	-0.288	2.309	-1.151	0.801	0.330	-0.798	2.580	-0.253	-0.073	42.520
12	17.091	-6.605	-0.274	3.271	-2.588	1.621	-1.295	-0.283	1.869	-1.429	0.592	-0.730	-0.135	0.178	-49.907
13	17.830	-9.031	1.536	0.245	-1.102	1.602	-2.944	1.128	-1.492	0.574	0.165	-1.623	0.456	-0.230	48.653
14	18.299	-10.660	2.946	-2.909	1.229	-0.323	-0.150	0.376	-1.318	1.067	-0.769	2.856	-0.550	0.212	-38.974
15	18.494	-11.358	3.599	-4.569	2.637	-1.885	2.912	-1.117	2.025	-1.280	0.676	-2.187	0.382	-0.135	23.389

Tabel 10 Mode Shape Bangunan SBV4 Arah Y

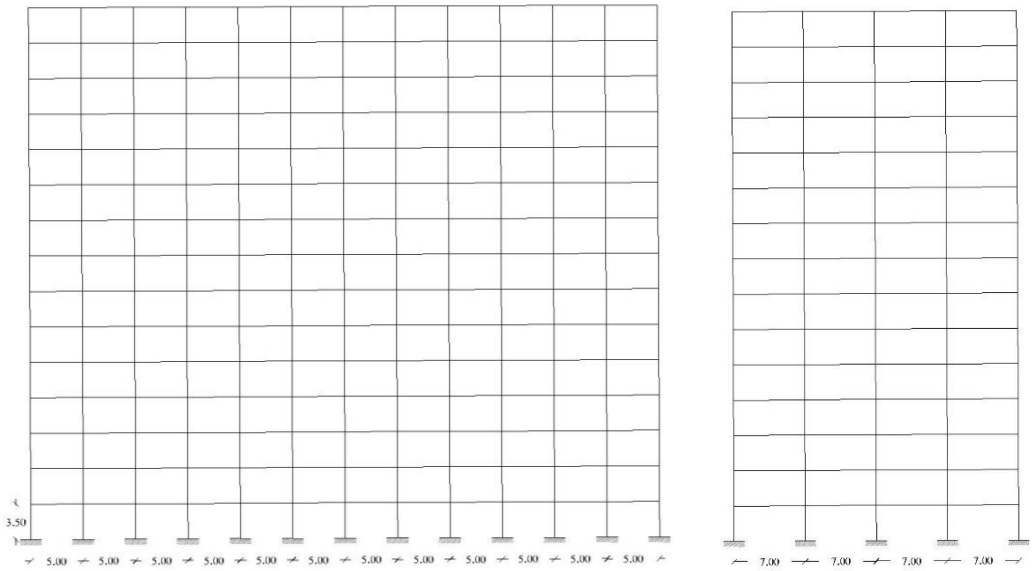
Lantai	mode 1	mode 2	mode 3	mode 4	mode 5	mode 6	mode 7	mode 8	mode 9	mode 10	mode 11	mode 12	mode 13	mode 14	mode 15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2.913	2.811	2.649	2.428	2.101	1.691	1.254	0.884	0.536	0.113	-0.300	-0.637	-0.827	-0.938	-1.048
3	4.786	4.299	3.563	2.646	1.468	0.293	-0.589	-1.038	-1.209	-1.092	-0.632	-0.004	0.451	0.749	1.071
4	6.593	5.291	3.488	1.545	-0.377	-1.467	-1.447	-0.840	-0.064	0.776	1.075	0.643	0.036	-0.458	-1.066
5	8.310	5.674	2.445	-0.325	-1.911	-1.414	0.114	1.073	1.234	0.460	-0.686	-1.002	-0.514	0.105	1.035
6	9.913	5.403	0.723	-2.034	-1.867	0.386	1.485	0.794	-0.417	-1.150	-0.234	0.923	0.866	0.262	-0.978
7	11.381	4.509	-1.199	-2.729	-0.283	1.709	0.373	-1.107	-1.071	0.476	0.973	-0.442	-1.005	-0.593	0.896
8	12.692	3.096	-2.788	-2.064	1.535	0.921	-1.363	-0.747	0.836	0.763	-0.959	-0.232	0.897	0.844	-0.792
9	13.830	1.327	-3.604	-0.370	2.086	-1.006	-0.820	1.139	0.745	-1.097	0.203	0.805	-0.568	-0.981	0.669
10	14.778	-0.596	-3.419	1.508	0.915	-1.689	1.094	0.699	-1.127	0.130	0.710	-1.027	0.099	0.985	-0.528
11	15.524	-2.449	-2.286	2.635	-1.011	-0.286	1.178	-1.168	-0.306	0.991	-1.074	0.800	0.393	-0.855	0.374
12	16.057	-4.021	-0.518	2.448	-2.103	1.471	-0.707	-0.650	1.246	-0.937	0.607	-0.224	-0.790	0.610	-0.211
13	16.639	-6.080	3.033	-0.164	-0.907	1.358	-2.013	2.778	-1.403	0.379	0.092	-0.642	2.518	-1.046	0.261
14	17.007	-7.484	5.797	-2.700	0.989	-0.323	-0.174	0.904	-0.919	0.698	-0.700	1.078	-3.006	1.074	-0.236
15	17.160	-8.090	7.075	-3.996	2.137	-1.649	1.966	-2.744	1.652	-0.840	0.636	-0.817	2.082	-0.709	0.149

LAMPIRAN II

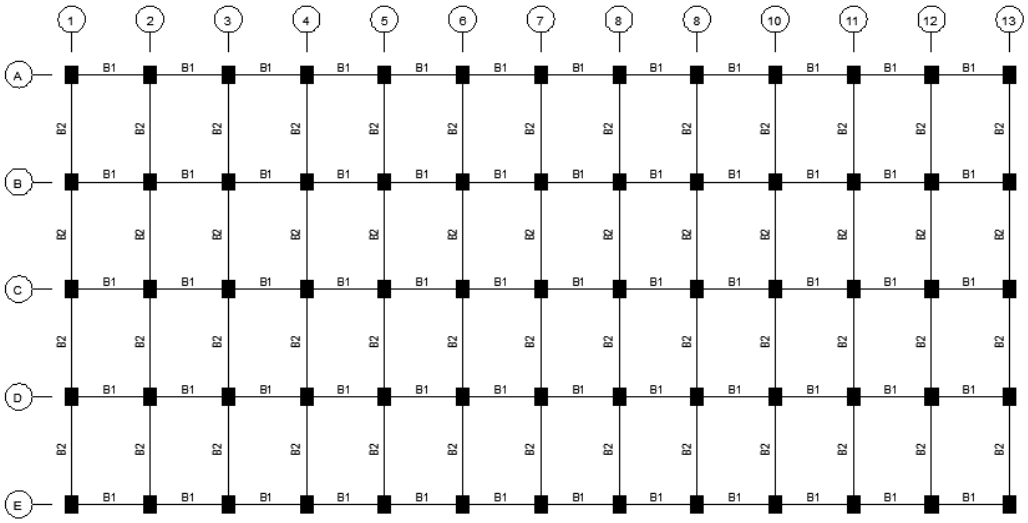
Verifikasi Perhitungan Manual dan Matlab

VERIFIKASI PERHITUNGAN PROGRAM MATLAB DENGAN PERHITUNGAN MANUAL

Struktur yang digunakan untuk perhitungan adalah struktur bangunan 15 tingkat.



a. Tampak X-Z b. Tampak Y-Z



c. Tampak Atas

Gambar 1 Denah Bangunan Reguler

Tahapan perhitungan respon struktur yaitu sebagai berikut.

1. Mencari nilai mode shape

Matriks Massa

$$[M] = \begin{bmatrix} m1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & m2 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & m3 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & m4 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & m5 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & m6 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & m7 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & m8 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & m9 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & m10 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & m11 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & m12 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & m13 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & m14 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & m15 \end{bmatrix}$$

$$[M] = \begin{bmatrix} 2171 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 2171 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 2171 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 2171 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 2171 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 2171 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 2171 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 2171 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 2171 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 2171 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 2171 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 2171 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 2171 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 2171 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1490 \end{bmatrix}$$

Matriks massa dibagi dengan unit massa yaitu 2171.2024, sehingga didapatkan mariks berikut.

$$[M] = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0.69 \end{bmatrix}$$

$$[K] = \begin{pmatrix} k1+k2 & -k2 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -k2 & k2+k3 & -k3 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -k3 & k3+k4 & -k4 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -k4 & k4+k5 & -k5 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -k5 & k5+k6 & -k6 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -k6 & k6+k7 & -k7 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -k7 & k7+k8 & -k8 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -k8 & k8+k9 & -k9 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -k9 & k9+k10 & -k10 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -k10 & k10+k11 & -k11 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -k11 & k11+12 & -k12 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -k12 & k12+k13 & -k13 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -k13 & k13+14 & -k14 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & & 0 & 0 & 0 & 0 & 0 & -k14 & k14+k15 & -k15 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -k15 & k15 \end{pmatrix}$$

$$[K] = \begin{pmatrix} 8623873 & -3633672 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -3633672 & 7267345 & -3633672 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -3633672 & 7267345 & -3633672 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -3633672 & 7267345 & -3633672 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -3633672 & 7267345 & -3633672 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -3633672 & 7267345 & -3633672 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -3633672 & 7267345 & -3633672 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -3633672 & 7267345 & -3633672 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -3633672 & 7267345 & -3633672 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -3633672 & 7267345 & -3633672 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -3633672 & 7267345 & -3633672 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -3633672 & 7267345 & -3633672 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -3633672 & 7267345 & -3633672 & \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -3633672 & 7228655 & -3594982 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -3594982 & 3594982 \end{pmatrix}$$

Matriks kekakuan dibagi dengan unit kekakuan yaitu 4990200.194, sehingga didapatkan mariks berikut.

$$[K] = \begin{pmatrix} 2 & -1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -0.73 & 1.46 & -0.73 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -0.73 & 1.46 & -0.73 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -0.73 & 1.46 & -0.73 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -0.73 & 1.46 & -0.73 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -0.73 & 1.46 & -0.73 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -0.73 & 1.46 & -0.73 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -0.73 & 1.46 & -0.73 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -0.73 & 1.46 & -0.73 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -0.73 & 1.46 & -0.73 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -0.73 & 1.46 & -0.73 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -0.73 & 1.46 & -0.73 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -0.73 & 1.46 & -0.73 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -0.73 & 1.45 & -0.72 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -0.72 & 0.72 \end{pmatrix}$$

Setelah didapatkan matriks massa dan kekakuan, maka langkah selanjutnya adalah menyusun eigen problem sebagai berikut.

$$\begin{bmatrix} 1.7 - 1.0\lambda & -0.7 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -0.7 & +1.5 - 1.0\lambda & -0.7 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & -0.7 & +1.5 - 1.0\lambda & -0.7 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & -0.7 & +1.5 - 1.0\lambda & -0.7 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & -0.7 & +1.5 - 1.0\lambda & -0.7 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & -0.7 & +1.5 - 1.0\lambda & -0.7 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -0.7 & +1.5 - 1.0\lambda & -0.7 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & -0.7 & +1.5 - 1.0\lambda & -0.7 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & -0.7 & +1.5 - 1.0\lambda & -0.7 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -0.7 & +1.5 - 1.0\lambda & -0.7 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -0.7 & +1.5 - 1.0\lambda & -0.7 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -0.7 & +1.5 - 1.0\lambda & -0.7 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -0.7 & +1.5 - 1.0\lambda & -0.7 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -0.7 & +1.4 - 1.0\lambda & -0.7 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & -0.7 & +0.7 - 0.7\lambda \end{bmatrix} \begin{bmatrix} \phi_1 \\ \phi_2 \\ \phi_3 \\ \phi_4 \\ \phi_5 \\ \phi_6 \\ \phi_7 \\ \phi_8 \\ \phi_9 \\ \phi_{10} \\ \phi_{11} \\ \phi_{12} \\ \phi_{13} \\ \phi_{14} \\ \phi_{15} \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

Dari matriks eigen problem diatas kemudian dijadikan persamaam, lalu diambil nilai φ1= 1 selanjutnya nilai φ1 didistribusikan ke persamaan 2 dan seterusnya hingga persamaan 15. Kemudian didapatkan akar persamaan sebagai berikut.

$\varphi 1 = 1$

$\varphi 2 = -1.3733\,\lambda + 2.3733$

$\varphi 3 = 1.886\,\lambda^2 - 6.006\,\lambda + 3.7466$

$\varphi 4 = -2.5901\,\lambda^3 + 12.0202\,\lambda^2 - 15.784\,\lambda + 5.12$

$\varphi 5 = 3.557\,\lambda^4 - 21.6877\,\lambda^3 + 43.8308\,\lambda^2 - 32.5933\,\lambda + 6.4933$

$\varphi 6 = -4.885\,\lambda^5 + 36.8983\,\lambda^4 - 100.9791\,\lambda^3 + 120.4025\,\lambda^2 - 58.3201\,\lambda + 7.8666$

$\varphi 7 = 6.7086\,\lambda^6 - 60.4432\,\lambda^5 + 208.9164\,\lambda^4 - 345.6219\,\lambda^3 + 277.0665\,\lambda^2 - 94.8502\,\lambda + 9.2399$

$\varphi 8 = -9.2131\,\lambda^7 + 96.4252\,\lambda^6 - 402.9108\,\lambda^5 + 855.5845\,\lambda^4 - 970.766\,\lambda^3 + 563.9902\,\lambda^2 - 144.0697\,\lambda + 10.6133$

$\varphi 9 = 12.6525\,\lambda^8 - 150.8489\,\lambda^7 + 739.4678\,\lambda^6 - 1920.3710\,\lambda^5 + 2835.4263\,\lambda^4 - 2370.4498\,\lambda^3 + 1048.7678\,\lambda^2 - 207.8646\,\lambda + 11.9866$

$\varphi 10 = -17.376\,\lambda^9 + 232.4691\,\lambda^8 - 1308.0117\,\lambda^7 + 4019.7971\,\lambda^6 - 7331.7831\,\lambda^5 + 8070.6578\,\lambda^4 - 5210.4290\,\lambda^3 + 1819.0103\,\lambda^2 - 288.1209\,\lambda + 13.3599$

$\varphi 11 = 23.8628\,\lambda^{10} - 354.0069\,\lambda^9 + 2248.6063\,\lambda^8 - 7985.6482\,\lambda^7 + 17369.0215\,\lambda^6 - 23826.8026\,\lambda^5 + 20461.4832\,\lambda^4 - 10548.4942\,\lambda^3 + 2984.9355\,\lambda^2 - 386.7246\,\lambda + 14.7332$

$\varphi 12 = -32.7713\,\lambda^{11} + 553.8909\,\lambda^{10} - 3778.6971\,\lambda^9 + 15231.6055\,\lambda^8 - 38516.5345\,\lambda^7 + 63440.1052\,\lambda^6 - 68422.0162\,\lambda^5 + 47338.7821\,\lambda^4 - 19985.8352\,\lambda^3 + 4681.9578\,\lambda^2 - 505.5618\,\lambda + 16.1065$

$\varphi 13 = 45.0056\,\lambda^{12} - 798.7465\,\lambda^{11} + 6233.2847\,\lambda^{10} - 28121.2779\,\lambda^9 + 81110.1880\,\lambda^8 - 156171.0786\,\lambda^7 + 203476.6119\,\lambda^6 - 178028.595\,\lambda^5 + 101663.0572\,\lambda^4 - 35853.0094\,\lambda^3 + 7073.2791\,\lambda^2 - 646.5185\,\lambda + 17.4799$

$\varphi 14 = -61.8071\,\lambda^{13} + 1186.9469\,\lambda^{12} - 10125.0254\,\lambda^{11} + 50552.2329\,\lambda^{10} - 163854.2204\,\lambda^9 + 361461.8639\,\lambda^8 - 553264.4199\,\lambda^7 + 588003.6081\,\lambda^6 - 427251.2316\,\lambda^5 + 205225.0394\,\lambda^4 - 61434.0694\,\lambda^3 + 10352.4780\,\lambda^2 - 811.4806\,\lambda + 18.8532$

$$\varphi 15 = 85.7946\ \lambda^{14} - 1771.8823\ \lambda^{13} + 16395.7408\ \lambda^{12} - 89723.3055\ \lambda^{11} + 322794.4394\ \lambda^{10} - 802793.7048\ \lambda^{9} + 1412817.9173\ \lambda^{8} - 1770840.0605\ \lambda^{7} + 1569737.0489\ \lambda^{6} - 964029.2464\ \lambda^{5} + 395178.3045\ \lambda^{4} - 101660.7293\ \lambda^{3} + 14793.3858\ \lambda^{2} - 1004.3881\ \lambda + 20.2413$$

$$0 = -58.8599\ \lambda^{15} + 1277.4170\ \lambda^{14} - 12480.3435\ \lambda^{13} + 72511.7257\ \lambda^{12} - 278798.2268\ \lambda^{11} + 746886.7514\ \lambda^{10} - 1429569.1283\ \lambda^{9} + 1972300.6192\ \lambda^{8} - 1954078.7482\ \lambda^{7} + 1368626.7690\ \lambda^{6} - 657813.7188\ \lambda^{5} + 206588.8516\ \lambda^{4} - 39128.7107\ \lambda^{3} + 3888.3336\ \lambda^{2} - 152.8589\ \lambda + 1$$

Kemudian didapatkan akar-akar persamaan sebagai berikut.

Akar-akar persamaan yang sudah didapatkan disubstitusikan kepersamaan φ1- φ15 kemudian hasilnya berupa pola goyangan struktur/ mode shape.

$\lambda 1 = 0.00807$
$\lambda 2 = 0.07206$
$\lambda 3 = 0.19707$
$\lambda 4 = 0.37728$
$\lambda 5 = 0.60435$
$\lambda 6 = 0.86781$
$\lambda 7 = 1.15561$
$\lambda 8 = 1.45471$
$\lambda 9 = 1.75179$
$\lambda 10 = 2.03396$
$\lambda 11 = 2.28951$
$\lambda 12 = 2.50861$
$\lambda 13 = 2.68390$
$\lambda 14 = 2.81078$
$\lambda 15 = 2.88719$

Akar-akar persamaan yang sudah didapatkan disubstitusikan kepersamaan φ1- φ15 kemudian hasilnya berupa pola goyangan struktur/ mode shape.

Tabel 1 Hasil Perhitungan Mode Shape Manual

Tingkat	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5	Mode 6	Mode 7	Mode 8	Mode 9	Mode 10	Mode 11	Mode 12	Mode 13	Mode 14	Mode 15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2.3622	2.2744	2.1027	1.8552	1.5434	1.1815	0.7863	0.3755	-0.0324	-0.4200	-0.7709	-1.0718	-1.3125	-1.4868	-1.5917
3	3.6983	3.3236	2.6363	1.7492	0.8058	-0.0451	-0.6753	-0.9992	-0.9868	-0.6669	-0.1179	0.5489	1.2127	1.7656	2.1278
4	4.9934	4.0440	2.4565	0.7369	-0.6006	-1.2180	-1.0652	-0.3778	0.4329	0.9490	0.9058	0.2786	-0.7320	-1.7974	-2.5894
5	6.2331	4.3642	1.6118	-0.6572	-1.5085	-0.9393	0.2354	0.9983	0.8112	-0.0859	-0.9186	-0.9515	0.0212	1.5777	2.9606
6	7.4038	4.2524	0.3309	-1.7108	-1.1644	0.4588	1.1624	0.3800	-0.7620	-0.8808	0.1452	1.0964	0.6962	-1.1374	-3.2282
7	8.4924	3.7199	-1.0395	-1.8780	0.1461	1.3101	0.2446	-0.9975	-0.5020	0.7847	0.7524	-0.6330	-1.1948	0.5379	3.3829
8	9.4869	2.8192	-2.1286	-1.0721	1.3353	0.6001	-1.0613	-0.3822	0.9657	0.2583	-1.0061	-0.1817	1.3182	0.1368	-3.4193
9	10.3763	1.6395	-2.6416	0.2892	1.4163	-0.8251	-0.6830	0.9966	0.1101	-0.9896	0.3989	0.8955	-1.0274	-0.7924	3.3362
10	11.1507	0.2976	-2.4398	1.5007	0.3218	-1.2669	0.7793	0.3844	-1.0104	0.5267	0.5497	-1.1125	0.4139	1.3371	-3.1365
11	11.8015	-1.0738	-1.5776	1.9346	-1.0398	-0.1988	1.0048	-0.9958	0.2999	0.5718	-1.0279	0.7121	0.3297	-1.6948	2.8270
12	12.3215	-2.3389	-0.2885	1.3662	-1.5384	1.1062	-0.3643	-0.3866	0.8887	-0.9803	0.6264	0.0834	-0.9697	1.8154	-2.4188
13	12.7050	-3.3726	1.0787	0.0899	-0.7602	1.0929	-1.1553	0.9949	-0.6605	0.2059	0.3111	-0.8326	1.3050	-1.6820	1.9259
14	12.9477	-4.0725	2.1540	-1.2330	0.6489	-0.2229	-0.1127	0.3888	-0.6207	0.8170	-0.9824	1.1199	-1.2304	1.3133	-1.3657
15	13.0479	-4.3725	2.6516	-1.9244	1.5288	-1.2844	1.1218	-1.0090	0.9289	-0.8719	0.8323	-0.8062	0.7908	-0.7833	0.7806

Tabel 2 Hasil Perhitungan Mode Shape Matlab

Tingkat	Mode 1	Mode 2	Mode 3	Mode 4	Mode 5	Mode 6	Mode 7	Mode 8	Mode 9	Mode 10	Mode 11	Mode 12	Mode 13	Mode 14	Mode 15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
2	2.3622	2.2744	2.1027	1.8552	1.5434	1.1815	0.7863	0.3755	-0.0324	-0.4200	-0.7709	-1.0718	-1.3125	-1.4868	-1.5917
3	3.6983	3.3236	2.6363	1.7492	0.8058	-0.0451	-0.6753	-0.9992	-0.9868	-0.6669	-0.1179	0.5489	1.2127	1.7656	2.1278
4	4.9934	4.0440	2.4565	0.7369	-0.6006	-1.2180	-1.0652	-0.3778	0.4329	0.9490	0.9058	0.2786	-0.7320	-1.7974	-2.5894
5	6.2331	4.3642	1.6118	-0.6572	-1.5085	-0.9393	0.2354	0.9983	0.8112	-0.0859	-0.9186	-0.9515	0.0212	1.5777	2.9606
6	7.4038	4.2524	0.3309	-1.7108	-1.1644	0.4588	1.1624	0.3800	-0.7620	-0.8808	0.1452	1.0964	0.6962	-1.1374	-3.2282
7	8.4924	3.7199	-1.0395	-1.8780	0.1461	1.3101	0.2446	-0.9975	-0.5020	0.7847	0.7524	-0.6330	-1.1948	0.5379	3.3829
8	9.4869	2.8192	-2.1286	-1.0721	1.3353	0.6001	-1.0613	-0.3822	0.9657	0.2583	-1.0061	-0.1817	1.3182	0.1368	-3.4193
9	10.3763	1.6395	-2.6416	0.2892	1.4163	-0.8251	-0.6830	0.9966	0.1101	-0.9896	0.3989	0.8955	-1.0274	-0.7924	3.3362
10	11.1507	0.2976	-2.4398	1.5007	0.3218	-1.2669	0.7793	0.3844	-1.0104	0.5267	0.5497	-1.1125	0.4139	1.3371	-3.1365
11	11.8015	-1.0738	-1.5776	1.9346	-1.0398	-0.1988	1.0048	-0.9958	0.2999	0.5718	-1.0279	0.7121	0.3297	-1.6948	2.8270
12	12.3215	-2.3389	-0.2885	1.3662	-1.5384	1.1062	-0.3643	-0.3866	0.8887	-0.9803	0.6264	0.0834	-0.9697	1.8154	-2.4188
13	12.7050	-3.3726	1.0787	0.0899	-0.7602	1.0929	-1.1553	0.9949	-0.6605	0.2059	0.3111	-0.8326	1.3050	-1.6820	1.9259
14	12.9477	-4.0725	2.1540	-1.2330	0.6489	-0.2229	-0.1127	0.3888	-0.6207	0.8170	-0.9824	1.1199	-1.2304	1.3133	-1.3657
15	13.0479	-4.3725	2.6516	-1.9244	1.5288	-1.2844	1.1218	-1.0090	0.9289	-0.8719	0.8323	-0.8062	0.7908	-0.7833	0.7806

Tabel 3 Selisih Perhitungan Mode Shape Manual dengan Matlab

Lantai	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00
2	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	0.E+00	-1.E-15	-2.E-15	-2.E-15	-2.E-15	-3.E-15	-3.E-15	-3.E-15	-4.E-15
3	0.E+00	0.E+00	0.E+00	0.E+00	-1.E-15	-1.E-15	-2.E-15	0.E+00	1.E-15	5.E-15	8.E-15	9.E-15	1.E-14	2.E-14	2.E-14
4	0.E+00	0.E+00	0.E+00	-2.E-15	-3.E-15	0.E+00	3.E-15	2.E-15	1.E-14	8.E-15	4.E-15	-6.E-15	-2.E-14	-3.E-14	-3.E-14
5	0.E+00	0.E+00	-4.E-15	-5.E-15	-6.E-15	-4.E-15	-5.E-15	-6.E-15	8.E-15	8.E-15	-4.E-14	8.E-15	-3.E-14	7.E-14	6.E-14
6	0.E+00	0.E+00	-6.E-15	0.E+00	9.E-15	2.E-14	4.E-14	6.E-14	2.E-13	3.E-13	3.E-13	2.E-13	8.E-14	4.E-13	7.E-13
7	0.E+00	-4.E-15	-2.E-15	1.E-14	2.E-14	2.E-14	6.E-14	-5.E-14	8.E-14	2.E-13	-6.E-13	-2.E-12	-2.E-12	-3.E-12	6.E-13
8	0.E+00	0.E+00	0.E+00	9.E-15	-5.E-14	-1.E-14	-4.E-13	-1.E-13	-4.E-13	3.E-12	-4.E-13	3.E-12	-2.E-12	1.E-11	9.E-12
9	0.E+00	-2.E-15	0.E+00	1.E-14	3.E-14	1.E-13	-5.E-13	-1.E-12	-4.E-12	1.E-11	9.E-12	-3.E-11	-5.E-11	-8.E-11	-1.E-11
10	0.E+00	-4.E-15	0.E+00	6.E-14	-1.E-13	3.E-13	5.E-13	6.E-12	9.E-12	6.E-11	-7.E-12	1.E-10	-6.E-11	3.E-10	2.E-10
11	0.E+00	0.E+00	1.E-14	5.E-14	-5.E-13	-2.E-12	-8.E-12	-3.E-11	-7.E-11	3.E-10	-3.E-10	-1.E-09	-2.E-09	-2.E-10	-1.E-09
12	0.E+00	0.E+00	5.E-14	3.E-13	3.E-13	3.E-12	-6.E-11	-1.E-10	-3.E-10	2.E-10	-4.E-09	-6.E-09	-2.E-08	-7.E-09	-2.E-08
13	0.E+00	0.E+00	7.E-15	5.E-13	-5.E-12	-2.E-11	-1.E-10	-2.E-10	-1.E-09	6.E-09	-1.E-08	-3.E-08	-7.E-08	-8.E-10	-5.E-08
14	0.E+00	2.E-14	-2.E-14	4.E-13	-2.E-13	1.E-11	7.E-11	3.E-10	3.E-09	6.E-08	3.E-08	1.E-07	-4.E-08	2.E-07	5.E-07
15	0.E+00	3.E-14	-6.E-14	-8.E-13	-2.E-11	-1.E-10	-4.E-10	-3.E-09	-2.E-08	6.E-08	-9.E-09	-7.E-07	-2.E-06	-2.E-06	-2.E-06

Setelah diketahui nilai mode shape maka perhitungan selanjutnya adalah frekuensi sudut (ω).

$$\omega = \sqrt{\lambda \, x \, \frac{Unit\ Kekakuan}{Unit\ Massa}}$$

$$\omega 1 = \sqrt{0.00807 \, x \, \frac{4990200,194}{2171.2024}} = 4.3066 \text{ rad/dt}$$

$$\omega 2 = \sqrt{0.07206 \, x \, \frac{4990200,194}{2171.2024}} = 12.8694 \text{ rad/dt}$$

$$\omega 3 = \sqrt{0.19707 \, x \, \frac{4990200,194}{2171.2024}} = 21.2821 \text{ rad/dt}$$

Tabel 4 Hasil Perhitungan ω Manual dan Matlab

	Manual	Matlab	Ketelitian
ω1	4.30656	4.30656	3.1539E-12
ω2	12.86940	12.86940	9.4271E-12
ω3	21.28209	21.28209	1.5589E-11
ω4	29.44685	29.44685	2.1572E-11
ω5	37.26939	37.26939	2.7299E-11
ω6	44.66029	44.66029	3.272E-11
ω7	51.53644	51.53644	3.7751E-11
ω8	57.82252	57.82252	4.2355E-11
ω9	63.45265	63.45265	4.6484E-11
ω10	68.37229	68.37229	5.0079E-11
ω11	72.54043	72.54043	5.3134E-11
ω12	75.93206	75.93206	5.5621E-11
ω13	78.54013	78.54013	5.7526E-11
ω14	80.37526	80.37526	5.8876E-11
ω15	81.46034	81.46034	5.9686E-11

Kontrol mode shape dengan perhitungan hubungan orthogonal untuk mengetahui apakah mode shape yang dihitung sudah benar atau belum. Jika nilai patisipasi mode sama dengan 1 maka mode shape yang didapatkan sudah sesuai.

2. Hubungan Orthogonal

Perhitungan orthogonal dilakukan pada setiap mode shape, namun pada lampiran ini hanya akan ditulis 1 contoh saja.

$$\{\varphi\}^T_1 [M] \{\varphi\}_1 = \begin{bmatrix} 1.00 & 2.36 & 3.70 & 4.99 & 6.23 & 7.40 & 8.49 & 9.49 & 10.38 & 11.15 & 11.80 & 12.32 & 12.70 & 12.95 & 13.05 \end{bmatrix} \times \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1.00 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1.00 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1.00 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1.00 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1.00 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1.00 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1.00 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1.00 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1.00 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1.00 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1.00 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1.00 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1.00 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0.69 \end{bmatrix} \times \begin{bmatrix} 1.00 \\ 2.36 \\ 3.70 \\ 4.99 \\ 6.23 \\ 7.40 \\ 8.49 \\ 9.49 \\ 10.38 \\ 11.15 \\ 11.80 \\ 12.32 \\ 12.70 \\ 12.95 \\ 13.05 \end{bmatrix} = 1269.939$$

$$\{\varphi\}^T_2 [M] \{\varphi\}_2 = \begin{bmatrix} 1 & 2.3622 & 3.6983 & 4.993 & 6.2331 & 7.4038 & 8.4924 & 9.48691 & 10.376 & 11.151 & 11.801 & 12.3215 & 12.705 & 12.9477 & 13.0479 \end{bmatrix} \times \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 1.00 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1.00 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1.00 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1.00 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 1.00 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1.00 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1.00 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1.00 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1.00 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1.00 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1.00 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1.00 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0.686 \end{bmatrix} \times \begin{bmatrix} 1 \\ 2.2744 \\ 3.3236 \\ 4.044 \\ 4.3642 \\ 4.2524 \\ 3.7199 \\ 2.8192 \\ 1.6395 \\ 0.2976 \\ -1.074 \\ -2.339 \\ -3.373 \\ -4.072 \\ -4.373 \end{bmatrix} = 0.000$$

Dan seterusnya sampai mode 15.

Tabel 5 Hubungan Orthogonal

Tingkat	ortho1	ortho2	ortho3	ortho4	ortho5	ortho6	ortho7	ortho8	ortho9	ortho10	ortho11	ortho12	ortho13	ortho14	ortho15
1	1269	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	142	0	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	52	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	28	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	17	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0
10	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0
12	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0
13	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0	0	27	0
15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	97

3. Partisipasi Mode

Rumus partisipasi mode = $\Gamma = \frac{P*}{M*}$

Table 6 Hasil Perhitungan Partisipasi Mode Manual dengan Matlab

	Manual	Matlab	Ketelitian
Γ1	0.09758	0.09758	-8.743E-15
Γ2	0.09707	0.09707	-1.3414E-13
Γ3	0.09601	0.09601	1.1609E-13
Γ4	0.09435	0.09435	-2.3358E-13
Γ5	0.09199	0.09199	-6.4972E-13
Γ6	0.08880	0.08880	-7.0558E-12
Γ7	0.08460	0.08460	-3.476E-11
Γ8	0.07914	0.07914	-2.7981E-10
Γ9	0.07215	0.07215	-1.5764E-09
Γ10	0.06333	0.06333	1.3557E-08
Γ11	0.05250	0.05250	1.16E-09
Γ12	0.03980	0.03980	-4.3639E-08
Γ13	0.02605	0.02605	-1.2167E-07
Γ14	0.01308	0.01308	-3.8976E-08
Γ15	0.00354	0.00354	-9.1937E-09
Total	1	1	

4. Integrasi Numerik

Perhitungan ini menggunakan metode Central Difference.

a. Menghitung nilai konstanta “a”

$a = [\omega^2 - \frac{2}{(\Delta t)^2}]$

$a_1 = [4.3066^2 - \frac{2}{0.01^2}] = -19981.454$

$a_2 = [12.8694^2 - \frac{2}{0.01^2}] = -19834.379$

$a_3 = [21.2821^2 - \frac{2}{0.01^2}] = -19547.073$

Dan seterusnya sampai mode ke 15.

b. Menghitung nilai konstanta “b”

$b = [\frac{1}{(\Delta t)^2} - \frac{2\xi\omega}{2\Delta t}]$

$b_1 = [\frac{1}{0.01^2} - \frac{2x\ 0.05\ x\ 4.3066}{2(0,01)}] = 9978.467$

$b_2 = [\ \frac{1}{0.01^2} - \frac{2x\ 0.05\ x\ 12.8694}{2(0,01)}\ ] = 9935.653$

$b_3 = [\ \frac{1}{0.01^2} - \frac{2x\ 0.05\ x\ 21.2821}{2(0,01)}\ ] = 9893.590$

Dan seterusnya sampai mode ke 15.

c. Menghitung nilai konstanta "ǩ"

$\check{k} = [\frac{1}{(\Delta t)^2} + \frac{2\xi\omega}{2\Delta t}]$

$\check{k}_1 = [\ \frac{1}{0.01^2} + \frac{2x\ 0.05\ x\ 4.306}{2(0,01)}\ ] = 10021.533$

$\check{k}_2 = [\ \frac{1}{0.01^2} + \frac{2x\ 0.05\ x\ 12.8694}{2(0,01)}\ ] = 10064.347$

$\check{k}_3 = [\ \frac{1}{0.01^2} + \frac{2x\ 0.05\ x\ 21.2821}{2(0,01)}\ ] = 10106.410$

Dan seterusnya sampai mode ke 15.

Tabel 7 Hasil Perhitungan Nilai Konstanta a, b dan ǩ

a1 =	-19981.454	b1 =	9978.467	k1 =	10021.533
a2 =	-19834.379	b2 =	9935.653	k2 =	10064.347
a3 =	-19547.073	b3 =	9893.590	k3 =	10106.410
a4 =	-19132.883	b4 =	9852.766	k4 =	10147.234
a5 =	-18610.993	b5 =	9813.653	k5 =	10186.347
a6 =	-18005.458	b6 =	9776.699	k6 =	10223.301
a7 =	-17343.995	b7 =	9742.318	k7 =	10257.682
a8 =	-16656.556	b8 =	9710.887	k8 =	10289.113
a9 =	-15973.761	b9 =	9682.737	k9 =	10317.263
a10 =	-15325.230	b10 =	9658.139	k10 =	10341.861
a11 =	-14737.885	b11 =	9637.298	k11 =	10362.702
a12 =	-14234.322	b12 =	9620.340	k12 =	10379.660
a13 =	-13831.448	b13 =	9607.299	k13 =	10392.701
a14 =	-13539.818	b14 =	9598.124	k14 =	10401.876
a15 =	-13364.213	b15 =	9592.698	k15 =	10407.302

d. Integrasi numerik

Integrase numerik diawali dengan menghitung nilai g, dimana nilai g akan digunakan untuk menghitung factor amplitude (Z) yang selanjutnya digunakan untuk menghitung respon dinamik struktur. Pada perhitungan ini menggunakan contoh pada perhitungan menggunakan gempa Duzce (frekuensi rendah)

$g_{i+1} = \frac{-\hat{y}i - agi - bgi - 1}{kt}$

Berikut ini adalah nontoh perhitungannya.

Time [sec]	DuzceEW (Turkey)
	Acc (cm/dt2)
0	-0.392
0.01	-0.392
0.02	-0.392
0.03	-0.392

$g_{1,0} = 0$

$g_{1,0.01} = 0$

$g_{1,0.02} = \frac{(-0.392) - (19981.454\ x\ 0) - (9978.467\ x\ 0)}{10021.533} = 0.00003912$

$g_{1,0.03} = \frac{(-0.392) - (19981.45\ x\ 0.00003912) - (9978.467\ x\ 0)}{10021.533} = 0.000117107$

Dan seterusnya sampai detik ke 51.74. Nilai g dihitung dari mode 1 sampai dengan mode 15.

Tabel 8 Hasil Perhitungan Nilai g

T(dt)	g1	g2	g3	g4	g5	g6	g7	g8	g9	g10	g11	g12	g13	g14	g15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.02	3.9116E-05	3.9116E-05	3.9116E-05	3.9116E-05	3.9116E-05	3.9116E-05	3.9116E-05	3.9116E-05	3.9116E-05	3.9116E-05	3.9116E-05	3.9116E-05	3.9116E-05	3.9116E-05	3.9116E-05
0.03	0.0001171	0.0001171	0.0001171	0.0001171	0.0001171	0.0001171	0.0001171	0.0001171	0.0001171	0.0001171	0.0001171	0.0001171	0.0001171	0.0001171	0.0001171
0.04	0.0002337	0.0002337	0.0002337	0.0002337	0.0002337	0.0002337	0.0002337	0.0002337	0.0002337	0.0002337	0.0002337	0.0002337	0.0002337	0.0002337	0.0002337
0.05	0.0003884	0.0003884	0.0003884	0.0003884	0.0003884	0.0003884	0.0003884	0.0003884	0.0003884	0.0003884	0.0003884	0.0003884	0.0003884	0.0003884	0.0003884
0.06	0.0005809	0.0005809	0.0005809	0.0005809	0.0005809	0.0005809	0.0005809	0.0005809	0.0005809	0.0005809	0.0005809	0.0005809	0.0005809	0.0005809	0.0005809
0.07	0.0008106	0.0008106	0.0008106	0.0008106	0.0008106	0.0008106	0.0008106	0.0008106	0.0008106	0.0008106	0.0008106	0.0008106	0.0008106	0.0008106	0.0008106
0.08	0.0010769	0.0010769	0.0010769	0.0010769	0.0010769	0.0010769	0.0010769	0.0010769	0.0010769	0.0010769	0.0010769	0.0010769	0.0010769	0.0010769	0.0010769
0.09	0.0013792	0.0013792	0.0013792	0.0013792	0.0013792	0.0013792	0.0013792	0.0013792	0.0013792	0.0013792	0.0013792	0.0013792	0.0013792	0.0013792	0.0013792
0.1	0.0017167	0.0017167	0.0017167	0.0017167	0.0017167	0.0017167	0.0017167	0.0017167	0.0017167	0.0017167	0.0017167	0.0017167	0.0017167	0.0017167	0.0017167
0.11	0.0020888	0.0020888	0.0020888	0.0020888	0.0020888	0.0020888	0.0020888	0.0020888	0.0020888	0.0020888	0.0020888	0.0020888	0.0020888	0.0020888	0.0020888
0.12	0.0024944	0.0024944	0.0024944	0.0024944	0.0024944	0.0024944	0.0024944	0.0024944	0.0024944	0.0024944	0.0024944	0.0024944	0.0024944	0.0024944	0.0024944
0.13	0.0029329	0.0029329	0.0029329	0.0029329	0.0029329	0.0029329	0.0029329	0.0029329	0.0029329	0.0029329	0.0029329	0.0029329	0.0029329	0.0029329	0.0029329
0.14	0.0034031	0.0034031	0.0034031	0.0034031	0.0034031	0.0034031	0.0034031	0.0034031	0.0034031	0.0034031	0.0034031	0.0034031	0.0034031	0.0034031	0.0034031
0.15	0.0039042	0.0039042	0.0039042	0.0039042	0.0039042	0.0039042	0.0039042	0.0039042	0.0039042	0.0039042	0.0039042	0.0039042	0.0039042	0.0039042	0.0039042
0.16	0.0044350	0.0044350	0.0044350	0.0044350	0.0044350	0.0044350	0.0044350	0.0044350	0.0044350	0.0044350	0.0044350	0.0044350	0.0044350	0.0044350	0.0044350
0.17	0.0049944	0.0049944	0.0049944	0.0049944	0.0049944	0.0049944	0.0049944	0.0049944	0.0049944	0.0049944	0.0049944	0.0049944	0.0049944	0.0049944	0.0049944
0.18	0.0055813	0.0055813	0.0055813	0.0055813	0.0055813	0.0055813	0.0055813	0.0055813	0.0055813	0.0055813	0.0055813	0.0055813	0.0055813	0.0055813	0.0055813
0.19	0.0061944	0.0061944	0.0061944	0.0061944	0.0061944	0.0061944	0.0061944	0.0061944	0.0061944	0.0061944	0.0061944	0.0061944	0.0061944	0.0061944	0.0061944
0.2	0.0068326	0.0068326	0.0068326	0.0068326	0.0068326	0.0068326	0.0068326	0.0068326	0.0068326	0.0068326	0.0068326	0.0068326	0.0068326	0.0068326	0.0068326

Dan seterusnya sampai detik 51.74

e. Faktor amplitudo (Z)

Rumus factor amplitudo adalah

$Z = \Gamma \times g$

$Z_{1,0} = 0.09758 \times 0 = 0$

$Z_{1,0.01} = 0.09758 \times 0 = 0$

$Z_{1,0.02} = 0.09758 \times 0.00003912 = 0.00003766$

$Z_{1,0.03} = 0.09758 \times 0.000117107 = 0.00008603$

Dan seterusnya sampai detik ke 51.74. Nilai Z dihitung dari mode 1 sampai dengan mode 15.

Tabel 9 Hasil Perhitungan Nilai Z

T(dt)	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	Z9	Z10	Z11	Z12	Z13	Z14	Z15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.02	3.81703E-06	3.78072E-06	3.72393E-06	3.64479E-06	3.54011E-06	3.40509E-06	3.23304E-06	3.01528E-06	2.74135E-06	2.40055E-06	1.98599E-06	1.50310E-06	9.82682E-07	4.92777E-07	1.33270E-07
0.03	1.14276E-05	1.12316E-05	1.09265E-05	1.05171E-05	1.00081E-05	9.40218E-06	8.69957E-06	7.89658E-06	6.98566E-06	5.95783E-06	4.81048E-06	3.56439E-06	2.29052E-06	1.13421E-06	3.04405E-07
0.04	2.28014E-05	2.21831E-05	2.12116E-05	1.99361E-05	1.84148E-05	1.67080E-05	1.48719E-05	1.29528E-05	1.09842E-05	8.98740E-06	6.98052E-06	4.99805E-06	3.12267E-06	1.51445E-06	4.01323E-07
0.05	3.79011E-05	3.64103E-05	3.40535E-05	3.10230E-05	2.75430E-05	2.38401E-05	2.01165E-05	1.65312E-05	1.31916E-05	1.01547E-05	7.43997E-06	5.05361E-06	3.02116E-06	1.41752E-06	3.68039E-07
0.06	5.66828E-05	5.36370E-05	4.88227E-05	4.27818E-05	3.61216E-05	2.94146E-05	2.31218E-05	1.75520E-05	1.28567E-05	9.05521E-06	6.07529E-06	3.80104E-06	2.11681E-06	9.40493E-07	2.35965E-07
0.07	7.90960E-05	7.35416E-05	6.48168E-05	5.41884E-05	4.30009E-05	3.24119E-05	2.32223E-05	1.58271E-05	1.02665E-05	6.33578E-06	3.70714E-06	2.03179E-06	1.00706E-06	4.09004E-07	9.70454E-08
0.08	1.05083E-04	9.57621E-05	8.12932E-05	6.42781E-05	4.73051E-05	3.23599E-05	2.05379E-05	1.20715E-05	6.57054E-06	3.33276E-06	1.60829E-06	7.66457E-07	3.66120E-07	1.57344E-07	4.03928E-08
0.09	1.34582E-04	1.19903E-04	9.75034E-05	7.22271E-05	4.85413E-05	2.94019E-05	1.59036E-05	7.61954E-06	3.27909E-06	1.42234E-06	8.25680E-07	6.71033E-07	5.38989E-07	3.20188E-07	9.56898E-08
0.1	1.67521E-04	1.45543E-04	1.12726E-04	7.74181E-05	4.66534E-05	2.42419E-05	1.06172E-05	3.95712E-06	1.65178E-06	1.39583E-06	1.66457E-06	1.71294E-06	1.36156E-06	7.64370E-07	2.18916E-07
0.11	2.03826E-04	1.72241E-04	1.26301E-04	7.94876E-05	4.20130E-05	1.79830E-05	6.08041E-06	2.22992E-06	2.22131E-06	3.14068E-06	3.58547E-06	3.23022E-06	2.29650E-06	1.19229E-06	3.26184E-07
0.12	2.43415E-04	1.99544E-04	1.37653E-04	7.83493E-05	3.53536E-05	1.18941E-05	3.43019E-06	2.89047E-06	4.63031E-06	5.75105E-06	5.53722E-06	4.34528E-06	2.78039E-06	1.33944E-06	3.50349E-07
0.13	2.86200E-04	2.26995E-04	1.46321E-04	7.41937E-05	2.76571E-05	7.15573E-06	3.25800E-06	5.58991E-06	7.82555E-06	7.98978E-06	6.52657E-06	4.46816E-06	2.56010E-06	1.13612E-06	2.82506E-07
0.14	3.32089E-04	2.54140E-04	1.51973E-04	6.74633E-05	2.00111E-05	4.63342E-06	5.48391E-06	9.33649E-06	1.05118E-05	8.86948E-06	6.11851E-06	3.60317E-06	1.81960E-06	7.35696E-07	1.73116E-07
0.15	3.80983E-04	2.80536E-04	1.54419E-04	5.88081E-05	1.34562E-05	4.72240E-06	9.41109E-06	1.28539E-05	1.16720E-05	8.08235E-06	4.61806E-06	2.30308E-06	1.03773E-06	4.02077E-07	9.51774E-08
0.16	4.32779E-04	3.05759E-04	1.53617E-04	4.90234E-05	8.84639E-06	7.29126E-06	1.39372E-05	1.50121E-05	1.09473E-05	6.09439E-06	2.86362E-06	1.32187E-06	6.81687E-07	3.37300E-07	9.59237E-08
0.17	4.87368E-04	3.29408E-04	1.49672E-04	3.89783E-05	6.73903E-06	1.17305E-05	1.78602E-05	1.51861E-05	8.73641E-06	3.88359E-06	1.76386E-06	1.18127E-06	9.30621E-07	5.60823E-07	1.68720E-07
0.18	5.44638E-04	3.51115E-04	1.42826E-04	2.95386E-05	7.32997E-06	1.70923E-05	2.01947E-05	1.34308E-05	5.99353E-06	2.46403E-06	1.83140E-06	1.89788E-06	1.59106E-06	9.11547E-07	2.61511E-07
0.19	6.04471E-04	3.70547E-04	1.33447E-04	2.14935E-05	1.04399E-05	2.22902E-05	2.04159E-05	1.04252E-05	3.82175E-06	2.42506E-06	2.95023E-06	3.01093E-06	2.23990E-06	1.16182E-06	3.13568E-07
0.2	6.66745E-04	3.87414E-04	1.22008E-04	1.54899E-05	1.55525E-05	2.63175E-05	1.85728E-05	7.21608E-06	3.03349E-06	3.69303E-06	4.47863E-06	3.87314E-06	2.49290E-06	1.16398E-06	2.94886E-07

Dan seterusnya sampai detik 51.74

f. Simpangan Horizontal (Y)

$Yn = (\phi_{n,1} \times Z_1) + (\phi_{n,2} \times Z_2) + (\phi_{n,3} \times Z_3) + (\phi_{n,4} \times Z_4) + (\phi_{n,5} \times Z_5) + (\phi_{n,6} \times Z_6) + (\phi_{n,7} \times Z_7) + (\phi_{n,8} \times Z_8) + (\phi_{n,9} \times Z_9) + (\phi_{n,10} \times Z_{10}) + (\phi_{n,11} \times Z_{11}) + (\phi_{n,12} \times Z_{12}) + (\phi_{n,13} \times Z_{13}) + (\phi_{n,14} \times Z_{14}) + (\phi_{n,15} \times Z_{15})$

$Y_{1,0} = (1 \times 0) + (1 \times 0) + (1 \times 0) + (1 \times 0) + (1 \times 0) + (1 \times 0) + (1 \times 0) + (1 \times 0) + (1 \times 0) + (1 \times 0) + (1 \times 0) + (1 \times 0) + (1 \times 0) + (1 \times 0) + (1 \times 0)$
$= 0$ cm

$Y_{1,0.01} = (1 \times 0) + (1 \times 0) + (1 \times 0) + (1 \times 0) + (1 \times 0) + (1 \times 0) + (1 \times 0) + (1 \times 0) + (1 \times 0) + (1 \times 0) + (1 \times 0) + (1 \times 0) + (1 \times 0) + (1 \times 0) + (1 \times 0)$
$= 0$ cm

$Y_{1,0.02} = (1 \times 3.817\text{x}10^{-6}) + (1 \times 3.781\text{x}10^{-6}) + (1 \times 3.724\text{x}10^{-6}) + (1 \times 3.645\text{x}10^{-6}) + (1 \times 3.540\text{x}10^{-6}) + (1 \times 3.405\text{x}10^{-6}) + (1 \times 3.233\text{x}10^{-6}) + (1 \times 3.015\text{x}10^{-6}) + (1 \times 2.741\text{x}10^{-6}) + (1 \times 2.400\text{x}10^{-6}) + (1 \times 1.986\text{x}10^{-6}) + (1 \times 1.503\text{x}10^{-6}) + (1 \times 9.827\text{x}10^{-7}) + (1 \times 4.928\text{x}10^{-7}) + (1 \times 1.333\text{x}10^{-7})$
$= 0.0000384$ cm

Dan seterusnya sampai detik ke 51.74. Nilai Z dihitung dari mode 1 sampai dengan mode 15.

Tabel 10 Hasil Perhitungan Nilai Y

T(dt)	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.02	3.8400E-05	3.8895E-05	3.9008E-05	3.9059E-05	3.9087E-05	3.9105E-05	3.9117E-05	3.9126E-05	3.9132E-05	3.9137E-05	3.9141E-05	3.9143E-05	3.9145E-05	3.9146E-05	3.9146E-05
0.03	0.00010516	0.00011595	0.00011662	0.00011689	0.00011703	0.00011712	0.00011719	0.00011723	0.00011726	0.00011728	0.00011730	0.00011731	0.00011732	0.00011733	0.00011733
0.04	0.00018607	0.00022876	0.00023235	0.00023317	0.00023359	0.00023386	0.00023403	0.00023416	0.00023425	0.00023432	0.00023437	0.00023440	0.00023443	0.00023444	0.00023445
0.05	0.00026807	0.00037170	0.00038530	0.00038754	0.00038851	0.00038910	0.00038949	0.00038976	0.00038996	0.00039010	0.00039021	0.00039028	0.00039034	0.00039037	0.00039038
0.06	0.00034322	0.00053566	0.00057345	0.00057949	0.00058150	0.00058262	0.00058336	0.00058387	0.00058424	0.00058451	0.00058470	0.00058485	0.00058494	0.00058500	0.00058503
0.07	0.00040996	0.00070967	0.00079277	0.00080815	0.00081218	0.00081418	0.00081544	0.00081632	0.00081694	0.00081739	0.00081773	0.00081797	0.00081813	0.00081823	0.00081827
0.08	0.00047153	0.00088368	0.00103672	0.00107181	0.00108005	0.00108348	0.00108553	0.00108692	0.00108791	0.00108863	0.00108915	0.00108952	0.00108978	0.00108993	0.00108999
0.09	0.00053283	0.00105126	0.00129657	0.00136735	0.00138428	0.00139015	0.00139337	0.00139549	0.00139698	0.00139805	0.00139883	0.00139939	0.00139976	0.00139999	0.00140008
0.1	0.00059745	0.00121085	0.00156291	0.00168977	0.00172342	0.00173371	0.00173868	0.00174181	0.00174396	0.00174551	0.00174663	0.00174742	0.00174796	0.00174828	0.00174841
0.11	0.00066616	0.00136505	0.00182764	0.00203212	0.00209495	0.00211338	0.00212109	0.00212562	0.00212868	0.00213084	0.00213239	0.00213349	0.00213424	0.00213468	0.00213486
0.12	0.00073726	0.00151834	0.00208594	0.00238617	0.00249490	0.00252789	0.00254012	0.00254665	0.00255089	0.00255385	0.00255596	0.00255745	0.00255846	0.00255906	0.00255930
0.13	0.00080816	0.00167453	0.00233695	0.00274375	0.00291765	0.00297516	0.00299506	0.00300453	0.00301037	0.00301436	0.00301717	0.00301915	0.00302048	0.00302127	0.00302158
0.14	0.00087696	0.00183496	0.00258322	0.00309840	0.00335617	0.00345194	0.00348477	0.00349880	0.00350682	0.00351213	0.00351584	0.00351842	0.00352014	0.00352117	0.00352158
0.15	0.00094340	0.00199847	0.00282877	0.00344665	0.00380286	0.00395364	0.00400750	0.00402878	0.00403989	0.00404693	0.00405175	0.00405508	0.00405730	0.00405861	0.00405914
0.16	0.00100861	0.00216247	0.00307705	0.00378842	0.00425070	0.00447428	0.00456055	0.00459348	0.00460911	0.00461846	0.00462470	0.00462895	0.00463177	0.00463343	0.00463409
0.17	0.00107417	0.00232464	0.00332941	0.00412630	0.00469464	0.00500701	0.00514008	0.00519136	0.00521388	0.00522638	0.00523442	0.00523982	0.00524337	0.00524546	0.00524629
0.18	0.00114112	0.00248414	0.00358486	0.00446394	0.00513237	0.00554493	0.00574104	0.00582015	0.00585326	0.00587023	0.00588062	0.00588746	0.00589191	0.00589450	0.00589553
0.19	0.00120945	0.00264174	0.00384104	0.00480432	0.00556449	0.00608217	0.00635735	0.00647661	0.00652593	0.00654942	0.00656295	0.00657160	0.00657715	0.00658037	0.00658164
0.2	0.00127835	0.00279910	0.00409564	0.00514851	0.00599362	0.00661486	0.00698252	0.00715643	0.00722993	0.00726311	0.00728098	0.00729195	0.00729886	0.00730284	0.00730440

Dan seterusnya sampai detik 51.74

g. Drift Rasio

Drift = $\frac{\Delta Y}{h}$ x 100%

Drift $_{1,0}$ = $\frac{0-0}{350}$ x 100% = 0%

Drift $_{1,0.01}$ = $\frac{0-0}{350}$ x 100% = 0%

Drift $_{1,0.02}$ = $\frac{0.0000384-0}{350}$ x100% = 0.00001097%

Dan seterusnya sampai detik ke 51.74. Nilai Z dihitung dari mode 1 sampai dengan mode 15.

Tabel 11 Hasil Perhitungan Nilai Interstory Drift

T(dt)	DR1	DR2	DR3	DR4	DR5	DR6	DR7	DR8	DR9	DR10	DR11	DR12	DR13	DR14	DR15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.02	1.0971E-05	1.4157E-07	3.2359E-08	1.4390E-08	8.0880E-09	5.1267E-09	3.4904E-09	2.4848E-09	1.8170E-09	1.3452E-09	9.9359E-10	7.1825E-10	4.9185E-10	2.9611E-10	1.1901E-10
0.03	3.0045E-05	3.0844E-06	1.9121E-07	7.5826E-08	4.1552E-08	2.6075E-08	1.7662E-08	1.2537E-08	9.1504E-09	6.7661E-09	4.9934E-09	3.6076E-09	2.4695E-09	1.4863E-09	5.9729E-10
0.04	5.3162E-05	1.2199E-05	1.0249E-06	2.3403E-07	1.2153E-07	7.4971E-08	5.0369E-08	3.5588E-08	2.5901E-08	1.9116E-08	1.4089E-08	1.0170E-08	6.9578E-09	4.1863E-09	1.6819E-09
0.05	7.6590E-05	2.9609E-05	3.8861E-06	6.4048E-07	2.7827E-07	1.6677E-07	1.1069E-07	7.7697E-08	5.6323E-08	4.1461E-08	3.0506E-08	2.1994E-08	1.5035E-08	9.0415E-09	3.6317E-09
0.06	9.8062E-05	5.4984E-05	1.0797E-05	1.7274E-06	5.7183E-07	3.2170E-07	2.0975E-07	1.4591E-07	1.0521E-07	7.7189E-08	5.6666E-08	4.0793E-08	2.7857E-08	1.6741E-08	6.7221E-09
0.07	1.1713E-04	8.5633E-05	2.3743E-05	4.3931E-06	1.1504E-06	5.7183E-07	3.6198E-07	2.4876E-07	1.7815E-07	1.3013E-07	9.5264E-08	6.8449E-08	4.6683E-08	2.8034E-08	1.1252E-08
0.08	1.3472E-04	1.1776E-04	4.3724E-05	1.0025E-05	2.3550E-06	9.7940E-07	5.8783E-07	3.9701E-07	2.8180E-07	2.0475E-07	1.4936E-07	1.0707E-07	7.2914E-08	4.3743E-08	1.7548E-08
0.09	1.5224E-04	1.4812E-04	7.0090E-05	2.0222E-05	4.8377E-06	1.6781E-06	9.2011E-07	6.0498E-07	4.2444E-07	3.0633E-07	2.2252E-07	1.5907E-07	1.0812E-07	6.4792E-08	2.5977E-08
0.1	1.7070E-04	1.7526E-04	1.0059E-04	3.6247E-05	9.6131E-06	2.9418E-06	1.4191E-06	8.9319E-07	6.1663E-07	4.4130E-07	3.1891E-07	2.2721E-07	1.5411E-07	9.2226E-08	3.6949E-08
0.11	1.9033E-04	1.9968E-04	1.3217E-04	5.8422E-05	1.7950E-05	5.2672E-06	2.2028E-06	1.2941E-06	8.7256E-07	6.1771E-07	4.4358E-07	3.1478E-07	2.1296E-07	1.2724E-07	5.0937E-08
0.12	2.1065E-04	2.2317E-04	1.6217E-04	8.5781E-05	3.1066E-05	9.4263E-06	3.4950E-06	1.8643E-06	1.2125E-06	8.4591E-07	6.0272E-07	4.2567E-07	2.8711E-07	1.7124E-07	6.8483E-08
0.13	2.3090E-04	2.4753E-04	1.8927E-04	1.1623E-04	4.9685E-05	1.6431E-05	5.6860E-06	2.7073E-06	1.6677E-06	1.1398E-06	8.0410E-07	5.6462E-07	3.7947E-07	2.2584E-07	9.0221E-08
0.14	2.5056E-04	2.7371E-04	2.1379E-04	1.4720E-04	7.3650E-05	2.7363E-05	9.3790E-06	4.0087E-06	2.2907E-06	1.5190E-06	1.0577E-06	7.3747E-07	4.9354E-07	2.9299E-07	1.1690E-07
0.15	2.6954E-04	3.0145E-04	2.3723E-04	1.7654E-04	1.0177E-04	4.3080E-05	1.5388E-05	6.0820E-06	3.1720E-06	2.0134E-06	1.3770E-06	9.5158E-07	6.3360E-07	3.7503E-07	1.4941E-07
0.16	2.8817E-04	3.2967E-04	2.6131E-04	2.0325E-04	1.3208E-04	6.3879E-05	2.4648E-05	9.4088E-06	4.4678E-06	2.6710E-06	1.7808E-06	1.2165E-06	8.0495E-07	4.7479E-07	1.8882E-07
0.17	3.0691E-04	3.5728E-04	2.8708E-04	2.2768E-04	1.6238E-04	8.9250E-05	3.8020E-05	1.4651E-05	6.4340E-06	3.5713E-06	2.2971E-06	1.5448E-06	1.0143E-06	5.9576E-07	2.3644E-07
0.18	3.2603E-04	3.8372E-04	3.1449E-04	2.5117E-04	1.9098E-04	1.1787E-04	5.6030E-05	2.2603E-05	9.4612E-06	4.8468E-06	2.9695E-06	1.9544E-06	1.2704E-06	7.4233E-07	2.9388E-07
0.19	3.4556E-04	4.0923E-04	3.4266E-04	2.7522E-04	2.1719E-04	1.4791E-04	7.8625E-05	3.4074E-05	1.4092E-05	6.7096E-06	3.8681E-06	2.4709E-06	1.5848E-06	9.2007E-07	3.6316E-07
0.2	3.6524E-04	4.3450E-04	3.7044E-04	3.0082E-04	2.4146E-04	1.7750E-04	1.0505E-04	4.9688E-05	2.1001E-05	9.4804E-06	5.1060E-06	3.1338E-06	1.9736E-06	1.1363E-06	4.4684E-07

Dan seterusnya sampai detik 51.74

h. Gaya Geser Tingkat (F)

F = [Y] x [K]

$F_{1,0}$ = (Y_1 x $K_{1,1}$) + (Y_2 x $K_{1,2}$)

= (0 x 8623873) + (0 x -3633672)

= 0 kg

$F_{1,0.01}$ = (Y_1 x $K_{1,1}$) + (Y_2 x $K_{1,2}$)

= (0 x 8623873) + (0 x -3633672)

= 0 kg

$F_{1,0.02}$ = (Y_1 x $K_{1,1}$) + (Y_2 x $K_{1,2}$)

= (0.0000384 x 8623873) + (0.00003889 x -3633672)

= 189.8219 kg

Dan seterusnya sampai detik ke 51.74. Nilai Z dihitung dari mode 1 sampai dengan mode 15.

Tabel 12 Hasil Perhitungan Nilai Gaya Horizontal Tingkat

T(dt)	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14	F15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.02	189.821844	1.38887808	0.22852509	0.08014712	0.03766163	0.02081042	0.01278831	0.0084931	0.00600054	0.00447186	0.00350175	0.0028793	0.00248941	0.00226849	0.00149742
0.03	485.52658	36.7949701	1.46742302	0.43589216	0.19683661	0.10699091	0.06518234	0.0430657	0.03032363	0.0225453	0.01762453	0.01447396	0.01250333	0.01138776	0.00751538
0.04	773.379666	142.10461	10.0581863	1.43075146	0.59216934	0.31288444	0.18798472	0.12319472	0.08629009	0.06392414	0.04984286	0.04085661	0.03524819	0.03207766	0.02116286
0.05	961.132071	327.144893	41.2769959	4.60651075	1.41810662	0.713135	0.4196334	0.27183368	0.18901249	0.1393253	0.10825082	0.08850892	0.07622469	0.06929329	0.0456953
0.06	1013.43302	561.974648	115.340005	14.6961134	3.18109635	1.42378626	0.81186474	0.5175941	0.35640829	0.26101181	0.20187116	0.16451746	0.14136436	0.12833184	0.08458057
0.07	956.71299	787.108776	246.086359	41.2409231	7.3579655	2.66877289	1.4399635	0.898043	0.61059112	0.44347969	0.34103547	0.27680607	0.23718708	0.21495338	0.14157276
0.08	855.420312	941.548212	428.583882	97.542476	17.4940962	4.97993101	2.42681053	1.46519602	0.97990702	0.70438858	0.53787168	0.43442146	0.37098822	0.33552104	0.22079698
0.09	775.167771	992.396824	634.210861	195.652723	40.1835966	9.63932966	4.00778984	2.29614577	1.50211627	1.06588148	0.80695297	0.64789561	0.55106749	0.49716777	0.32684896
0.1	752.502423	949.622252	818.276317	338.730483	84.8446894	19.3653635	6.6888817	3.51721787	2.22983913	1.55654649	1.16619152	0.92971869	0.7870153	0.70799885	0.46491433
0.11	784.70865	858.608898	937.925179	514.715343	161.301217	38.9735896	11.5563013	5.36113766	3.24110158	2.21451208	1.63811424	1.29497333	1.09007934	0.97734258	0.64091392
0.12	840.90644	775.7443	971.497076	695.859982	275.206046	75.4323062	20.7392037	8.29020262	4.66185726	3.09275894	2.25176205	1.76220898	1.47364403	1.31606603	0.86168363
0.13	884.790384	741.041011	928.878366	846.281137	422.925557	136.6489	37.8826336	13.2204818	6.71444901	4.26915664	3.04568252	2.35468628	1.95387161	1.73697964	1.1352003
0.14	895.148567	762.163053	846.894051	935.338183	588.675629	228.712966	68.2988205	21.8497944	9.81386991	5.86666465	4.07300898	3.10222001	2.55058063	2.25536485	1.47086954
0.15	873.978798	816.746149	771.865972	950.821164	746.456056	352.180484	118.358059	37.009237	14.7345306	8.09382407	5.41075359	4.04405717	3.28848554	2.88967524	1.87989796
0.16	840.407368	869.452119	738.405362	905.110841	867.374043	498.930712	193.813835	62.8390713	22.851064	11.320608	7.17757382	5.23367065	4.19901263	3.66248865	2.37578217
0.17	816.499511	892.827931	755.326651	830.516408	930.07025	651.543151	297.204487	104.497195	36.4065101	16.2052012	9.56747148	6.7472389	5.32309194	4.60183483	2.97496275
0.18	814.287096	880.454528	805.354061	765.455106	929.739694	786.528779	425.115648	167.137753	58.6842052	23.8755179	12.9101492	8.69914815	6.71569456	5.74310967	3.69771698
0.19	830.946768	846.600731	857.634642	738.01549	881.145284	881.126583	566.599122	254.123619	93.8871593	36.1377784	17.7691569	11.2701016	8.45358278	7.13195364	4.56940865
0.2	853.287131	814.719935	885.40859	754.942204	813.461347	921.420012	704.03369	364.841968	146.517552	55.6334211	25.0815864	14.7556755	10.6489082	8.82878765	5.62229414

Dan seterusnya sampai detik 51.74

i. Gaya Geser Dasar (V)

$V = \sum F$

$V_{1,0}$ = 0 + 0 + 0 + 0 + 0 + 0 + 0 +0 + 0 + 0 + 0 + 0 + 0 + 0 + 0

= 0 kg

$V_{1,0.01}$ = 0 + 0 + 0 + 0 + 0 + 0 + 0 +0 + 0 + 0 + 0 + 0 + 0 + 0 + 0

= 0 kg

$V_{1,0.02}$ = 189.8219 + 1.3887 + 0.2287 + 0.08 + 0.0377 + 0.0208 + 0.0127 + 0.0086 + 0.0059 + 0.0045 + 0.0035 + 0.0028 + 0.0025 + 0.0022 + 0.0015

= 191.6223 kg

Dan seterusnya sampai detik ke 51.74. Nilai Z dihitung dari mode 1 sampai dengan mode 15.

Tabel 13 Hasil Perhitungan Nilai Gaya Geser Dasar

T(dt)	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	V13	V14	V15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.02	191.622257	1.80041252	0.41153444	0.18300935	0.10286223	0.0652006	0.04439019	0.03160187	0.02310877	0.01710824	0.01263638	0.00913463	0.00625533	0.00376591	0.00149742
0.03	524.753315	39.2267347	2.43176463	0.96434161	0.52844945	0.33161283	0.22462193	0.15943959	0.11637388	0.08605025	0.06350495	0.04588042	0.03140647	0.01890314	0.00751538
0.04	928.51885	155.139184	13.0345734	2.97638708	1.54563562	0.95346628	0.64058185	0.45259712	0.32940241	0.24311232	0.17918818	0.12934532	0.08848871	0.05324052	0.02116286
0.05	1337.69949	376.567419	49.4225261	8.14553025	3.5390195	2.12091288	1.40777789	0.98814448	0.7163108	0.52729831	0.38797301	0.27972219	0.19121328	0.11498859	0.0456953
0.06	1712.71622	699.283194	137.308546	21.9685403	7.27242695	4.0913306	2.66754434	1.8556796	1.3380855	0.9816772	0.72066539	0.51879423	0.35427677	0.21291241	0.08458057
0.07	2045.77942	1089.06643	301.957653	55.8712936	14.6303705	7.27240496	4.60363207	3.16366857	2.26562557	1.65503445	1.21155475	0.87051928	0.59371322	0.35652614	0.14157276
0.08	2353.04481	1497.6245	556.076287	127.492405	29.9499287	12.4558325	7.47590154	5.049091	3.58389498	2.60398797	1.89959938	1.3617277	0.92730624	0.55631802	0.22079698
0.09	2658.95297	1883.7852	891.388376	257.177515	61.5247924	21.3411958	11.7018662	7.69407631	5.39793055	3.89581428	2.82993279	2.02297983	1.37508422	0.82401673	0.32684896
0.1	2981.38985	2228.88743	1279.26518	460.988859	122.258377	37.4136874	18.0483239	11.3594422	7.84222431	5.61238518	4.05583869	2.88964717	1.95992848	1.17291318	0.46491433
0.11	3324.24735	2539.5387	1680.9298	743.004625	228.289282	66.9880657	28.0144761	16.4581747	11.0970371	7.8559355	5.64142341	4.00330917	2.70833583	1.6182565	0.64091392
0.12	3679.09554	2838.1891	2062.4448	1090.94772	395.087739	119.881693	44.4493872	23.7101835	15.4199809	10.7581237	7.66536471	5.41360267	3.65139368	2.17774965	0.86168363
0.13	4032.8785	3148.08811	2407.0471	1478.16873	631.887598	208.962042	72.3131414	34.4305079	21.210026	14.495577	10.2264204	7.18073783	4.82605155	2.87217994	1.1352003
0.14	4376.21364	3481.06508	2718.90202	1872.00797	936.669788	347.99416	119.281193	50.982373	29.1325786	19.3187087	13.452044	9.37903503	6.27681503	3.72623439	1.47086954
0.15	4707.75714	3833.77835	3017.0322	2245.16622	1294.34506	547.889005	195.708521	77.3504612	40.3412242	25.6066936	17.5128695	12.1021159	8.05805873	4.7695732	1.87989796
0.16	5033.15355	4192.74618	3323.29407	2584.8887	1679.77786	812.403819	313.473107	119.659271	56.8202	33.9691359	22.6485279	15.4709541	10.2372835	6.03827082	2.37578217
0.17	5360.3119	4543.81238	3650.98445	2895.6578	2065.14139	1135.07114	483.527993	186.323507	81.8263112	45.4198011	29.2145999	19.6471284	12.8998895	7.57679759	2.97496275
0.18	5694.39821	4880.11111	3999.65658	3194.30252	2428.84742	1499.10772	712.578942	287.463294	120.325542	61.6413364	37.7658185	24.8556694	16.1565212	9.44082665	3.69771698
0.19	6035.41138	5204.46461	4357.86388	3500.22924	2762.21375	1881.06847	999.941882	433.34276	179.219141	85.331982	49.1942035	31.4250466	20.1549451	11.7013623	4.56940865
0.2	6379.2031	5525.91597	4711.19604	3825.78745	3070.84524	2257.38389	1335.96388	631.930193	267.088225	120.570673	64.937252	39.8556655	25.09999	14.4510818	5.62229414

Dan seterusnya sampai detik 51.74

j. Momen Guling (M)

$M = \sum (F \times h)$

h1 =	3.5 m	h6 =	21 m	h11 =	38.5 m
h2 =	7 m	h7 =	24.5 m	h12 =	42 m
h3 =	10.5 m	h8 =	28 m	h13 =	45.5 m
h4 =	14 m	h9 =	31.5 m	h14 =	49 m
h5 =	17.5 m	h10 =	35 m	h15 =	52.5 m

$M_{1,0}$ = (0x3.5) + (0x7) + (0x10.5) + (0x14) + (0x17.5) + (0x21) + (0x24.5) + (0x28) + (0x31.5) + (0x35) + (0x38.5) + (0x42) + (0x45.5) + (0x49) + (0x52.5)

= 0 kg.cm

$M_{1,0.01}$ = (0x3.5) + (0x7) + (0x10.5) + (0x14) + (0x17.5) + (0x21) + (0x24.5) + (0x28) + (0x31.5) + (0x35) + (0x38.5) + (0x42) + (0x45.5) + (0x49) + (0x52.5)

= 0 kg.cm

$M_{1,0.02}$ = (189.8219 x 3.5) + (1.3887 x 7) + (0.2287 x 10.5) + (0.08 x 14) + (0.0377 x 17.5) + (0.0208 x 21) + (0.0127 x 24.5) + (0.0086 x 28) + (0.006 x 31.5) + (0.0044 x 35) + (0.0035 x 38.5) + (0.0028 x 42) + (0.0025 x 45.5) + (0.0022 x 49) + (0.0015 x 52.5)

= 680.1718 kg.cm

Tabel 14 Hasil Perhitungan Nilai Momen

T(dt)	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12	M13	M14	M15
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.02	680.171712	15.7952564	6.07310984	3.67359641	2.55153672	1.89245826	1.45543955	1.14212584	0.90431906	0.71530218	0.55878709	0.42396966	0.30303897	0.18977074	0.07861452
0.03	1991.4647	292.121669	34.5568782	19.1489365	13.0464462	9.60180552	7.35499645	5.75802916	4.55218947	3.596995	2.80790957	2.12936521	1.52145909	0.95255764	0.39455749
0.04	3865.06825	1158.23942	163.50715	57.8961933	37.8656729	27.5027094	20.9321362	16.3265105	12.8770585	10.1589208	7.92157594	6.00262581	4.28664815	2.68285533	1.11105
0.05	6237.53907	2873.57682	583.562577	150.15412	85.6629699	60.846104	45.8702691	35.5892506	27.9779076	22.024014	17.1476287	12.9799722	9.2625977	5.79437431	2.39900321
0.06	9069.81064	5522.79506	1588.97253	377.902472	172.156885	116.487699	86.5881872	66.697501	52.2048662	40.978005	31.8425916	24.0705518	17.1608186	10.7287401	4.44047987
0.07	12353.038	9004.54249	3494.78106	910.874288	333.501364	204.736968	148.692737	113.413632	88.2684276	69.0348072	53.5130179	40.3831523	28.7572974	17.9652855	7.43256977
0.08	16101.1284	13107.1573	6516.31978	2016.18901	650.59435	344.447667	239.869116	180.412258	139.386769	108.519698	83.8660975	63.1580377	44.9123363	28.0323725	11.5918414
0.09	20335.8351	17622.7479	10675.9701	4016.7561	1277.61798	574.405037	371.979114	273.788263	209.496181	162.179519	124.873667	93.8059774	66.5943619	41.5207912	17.1595706
0.1	25072.6315	22438.873	15791.5172	7199.61592	2457.38916	972.607096	565.934462	402.056861	303.57476	233.334828	178.8557	133.957327	94.9091419	59.0999459	24.4080024
0.11	30313.6249	27567.1447	21556.8824	11708.668	4502.65319	1679.8819	861.436515	578.307133	428.195278	326.100578	248.592655	185.525257	131.136377	81.5377671	33.6479808
0.12	36049.1392	33105.9667	27675.7566	17475.0373	7732.99751	2916.89171	1332.81328	824.702785	592.577112	445.728608	337.482045	250.789206	176.776429	109.725626	45.2383905
0.13	42265.0267	39168.2604	33980.9733	24227.7505	12379.8146	4978.61732	2108.99042	1180.8659	810.692403	599.187259	449.766777	332.508	233.611176	144.710018	59.5980157
0.14	48950.5538	45817.5338	40482.3924	31590.0049	18495.2703	8193.44683	3390.47454	1717.15344	1105.3592	796.222296	590.889034	434.078188	303.784947	187.733529	77.2206511
0.15	56102.5409	53043.6151	47326.392	39221.7993	25910.303	12847.3221	5451.53188	2551.75943	1515.50079	1051.36308	768.079236	559.765223	389.914821	240.288729	98.6946429
0.16	63724.3485	60782.9227	54696.7579	46943.5016	34271.9498	19092.9041	8615.3591	3866.92013	2107.42614	1387.61762	991.396342	715.05975	495.245582	304.190508	124.728564
0.17	71821.3652	68963.6169	62713.8214	54782.8916	43155.6619	26879.4325	13197.0263	5915.5164	2989.59493	1842.78986	1275.60782	907.260168	623.876135	381.675451	156.185544
0.18	80396.2223	77546.2175	71383.0358	62926.8181	52210.4466	35940.002	19422.8976	9007.56425	4327.70717	2479.15471	1643.51158	1146.47084	781.106618	475.542515	194.130141
0.19	89446.4622	86538.1485	80611.9434	71606.7797	61274.5628	45854.5203	27350.8621	13469.1836	6353.72227	3396.27675	2131.45451	1447.34196	973.997699	589.359682	239.893954
0.2	98965.4783	95978.9734	90275.9338	80979.1436	70409.9528	56174.3792	36824.559	19575.7335	9360.15843	4744.85555	2797.68581	1832.04473	1212.30636	727.781037	295.170442

Dan seterusnya sampai detik 51.74

Tabel 15 Hasil Perhitungan Nilai g Maksimum Manual dan Matlab

	Manual	Matlab	Ketelitian
g1	11.54902	11.54902	2.944E-11
g2	1.34953	1.34953	-8.715E-13
g3	0.23095	0.23095	4.5347E-13
g4	0.12543	0.12543	1.604E-13
g5	0.05155	0.05155	3.1003E-14
g6	0.03735	0.03735	5.8273E-14
g7	0.02568	0.02568	4.767E-14
g8	0.02164	0.02164	6.4844E-15
g9	0.01772	0.01772	2.9074E-14
g10	0.01477	0.01477	2.4269E-14
g11	0.01327	0.01327	1.7935E-14
g12	0.01220	0.01220	1.6726E-14
g13	0.01137	0.01137	1.7699E-14
g14	0.01089	0.01089	1.1937E-14
g15	0.01070	0.01070	9.3207E-15

Tabel 16 Hasil Perhitungan Nilai Z Maksimum Manual dan Matlab

	Manual	Matlab	Ketelitian
Z1	1.12699	1.12699	2.9738E-12
Z2	0.13100	0.13100	9.6451E-14
Z3	0.02217	0.02217	1.6726E-14
Z4	0.01183	0.01183	4.4431E-14
Z5	0.00474	0.00474	3.6348E-14
Z6	0.00332	0.00332	2.6873E-13
Z7	0.00217	0.00217	8.9655E-13
Z8	0.00171	0.00171	6.0553E-12
Z9	0.00128	0.00128	2.7928E-11
Z10	0.00094	0.00094	-2.003E-10
Z11	0.00070	0.00070	-1.539E-11
Z12	0.00049	0.00049	5.3221E-10
Z13	0.00030	0.00030	1.3834E-09
Z14	0.00014	0.00014	4.245E-10
Z15	0.00004	0.00004	9.8387E-11

Tabel 17 Hasil Perhitungan Nilai Simpangan (Y) Maksimum Manual dan Matlab

	Manual	Matlab	Ketelitian
Y1	1.12024	1.12024	-1.561E-10
Y2	2.64712	2.64712	2.2454E-10
Y3	4.14169	4.14169	-2.136E-10
Y4	5.58916	5.58916	1.5978E-10
Y5	6.97350	6.97350	-1.781E-11
Y6	8.28579	8.28579	-4.667E-11
Y7	9.51398	9.51398	1.1963E-10
Y8	10.64380	10.64380	-5.75E-11
Y9	11.66750	11.66750	7.5683E-11
Y10	12.56857	12.56857	2.3233E-11
Y11	13.33495	13.33495	1.6245E-11
Y12	13.94943	13.94943	7.0099E-11
Y13	14.40850	14.40850	4.1478E-12
Y14	14.70033	14.70033	7.9408E-11
Y15	14.82105	14.82105	-3.852E-11

Tabel 18 Hasil Perhitungan Nilai *Interstory Drift* Maksimum Manual dan Matlab

	Manual	Matlab	Ketelitian
DR1	0.320067	0.320067	-4.46.E-11
DR2	0.436253	0.436253	1.09.E-10
DR3	0.427662	0.427662	-1.20.E-10
DR4	0.414961	0.414961	8.98.E-11
DR5	0.399115	0.399115	-4.40.E-11
DR6	0.379971	0.379971	-2.33.E-12
DR7	0.357506	0.357506	1.60.E-11
DR8	0.331210	0.331210	1.28.E-11
DR9	0.300557	0.300557	-3.80.E-11
DR10	0.265426	0.265426	1.93.E-11
DR11	0.225605	0.225605	2.54.E-12
DR12	0.181965	0.181965	-2.60.E-11
DR13	0.135019	0.135019	4.25.E-11
DR14	0.085777	0.085777	-7.09.E-11
DR15	0.035511	0.035511	1.14.E-10

Tabel 19 Hasil Perhitungan Nilai Gaya Horizontal Tingkat Maksimum Manual dan Matlab

	Manual	Matlab	Ketelitian
F1	166446.71	166446.68	0.024377
F2	224530.05	224530.08	-0.030927
F3	271989.87	271989.84	0.031845
F4	311029.31	311029.33	-0.022403
F5	360197.48	360197.47	0.001792
F6	395550.33	395550.33	0.002338
F7	419409.98	419409.98	-0.002476
F8	442334.99	442334.99	-0.000751
F9	470017.69	470017.69	0.000720
F10	512367.99	512367.99	-0.000135
F11	559833.12	559833.12	0.000049
F12	598254.21	598254.21	-0.000515
F13	626567.17	626567.17	0.001196
F14	644081.79	644081.80	-0.002335
F15	446812.08	446812.08	0.001434

Tabel 19 Hasil Perhitungan Nilai Gaya Geser Dasar Maksimum Manual dan Matlab

	Manual	Matlab	Ketelitian
V1	5590201.2	5590201.2	-0.000779
V2	5548198.2	5548198.2	0.001383
V3	5438937.9	5438937.9	-0.001532
V4	5277415.5	5277415.5	0.001142
V5	5075883.7	5075883.7	-0.000559
V6	4832410.3	4832410.3	-0.000030
V7	4546705.6	4546705.6	0.000204
V8	4212278.7	4212278.7	0.000163
V9	3822434.4	3822434.4	-0.000483
V10	3375648.0	3375648.0	0.000246
V11	2869211.2	2869211.2	0.000032
V12	2314204.2	2314204.2	-0.000331
V13	1717152.4	1717152.4	0.000541
V14	1090893.9	1090893.9	-0.000901
V15	446812.1	446812.1	0.001434

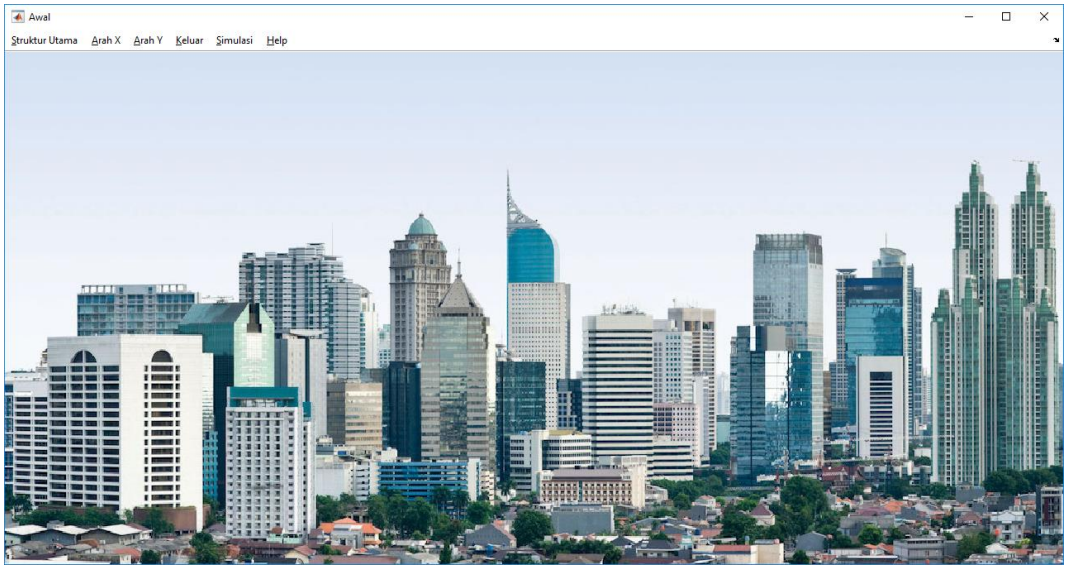
Tabel 20 Hasil Perhitungan Nilai Momen Guling Maksimum Manual dan Matlab

	Manual	Matlab	Ketelitian
V1	193613203	193613203	-0.000936
V2	193544840	193544840	0.003820
V3	193143230	193143230	-0.008853
V4	192056449	192056449	0.009319
V5	189837706	189837706	-0.002436
V6	186149608	186149608	-0.000654
V7	180495766	180495766	-0.001045
V8	172479174	172479174	0.004828
V9	161710679	161710679	-0.013016
V10	147636907	147636907	0.009932
V11	129940138	129940138	0.004840
V12	108586887	108586887	-0.010676
V13	83510712	83510712	0.025941
V14	55017642	55017642	-0.039153
V15	23457634	23457634	0.075265

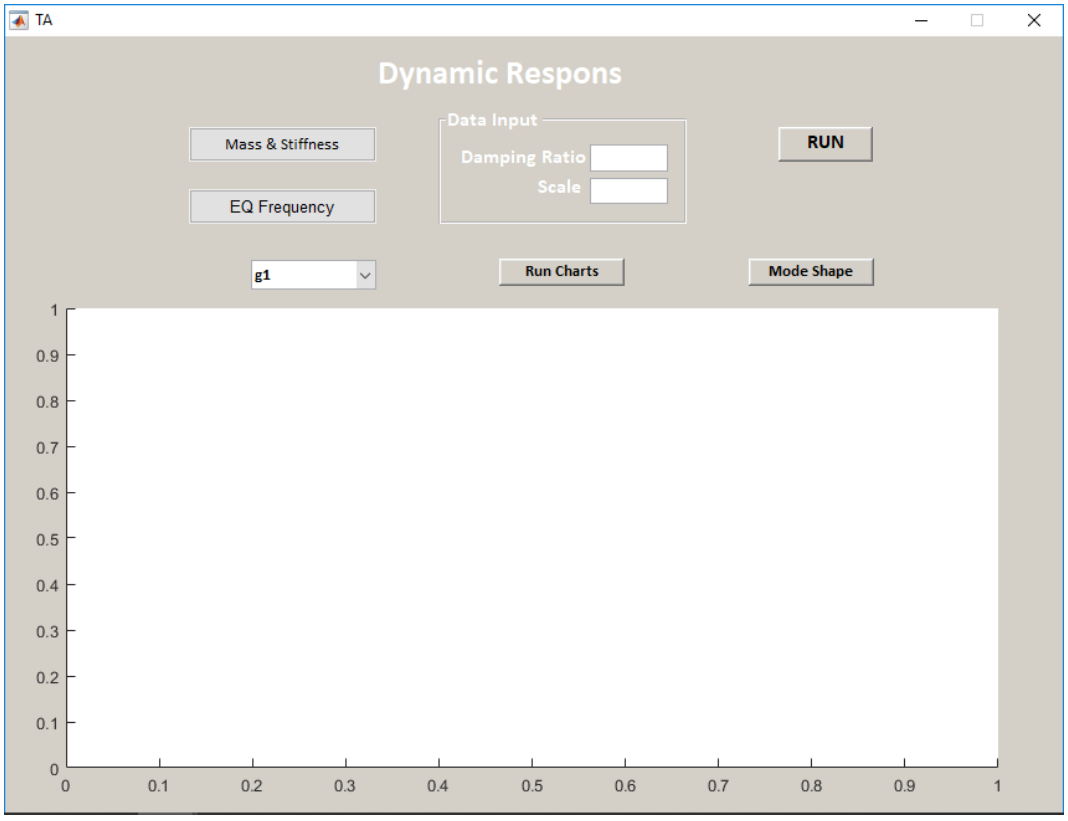
LAMPIRAN II

Script Pembuatan Program Matlab

Menu Awal Program Matlab



Gambar 1 Tampilan Menu Awal



Gambar 2 Tampilan Menu Running untuk Arah X dan Y

Script:

```
function varargout = TA(varargin)
% TA MATLAB code for TA.fig
%      TA, by itself, creates a new TA or raises the existing
%      singleton*.
%
%      H = TA returns the handle to a new TA or the handle to
%      the existing singleton*.
%
%      TA('CALLBACK',hObject,eventData,handles,...) calls the
local
%      function named CALLBACK in TA.M with the given input
arguments.
%
%      TA('Property','Value',...) creates a new TA or raises the
%      existing singleton*.  Starting from the left, property
value pairs are
%      applied to the GUI before TA_OpeningFcn gets called.  An
%      unrecognized property name or invalid value makes property
application
%      stop.  All inputs are passed to TA_OpeningFcn via varargin.
%
%      *See GUI Options on GUIDE's Tools menu.  Choose "GUI allows
only one
%      instance to run (singleton)".
%
% See also: GUIDE, GUIDATA, GUIHANDLES

% Edit the above text to modify the response to help TA

% Last Modified by GUIDE v2.5 05-Oct-2018 03:43:47

% Begin initialization code - DO NOT EDIT
gui_Singleton = 1;
gui_State = struct('gui_Name',       mfilename, ...
                   'gui_Singleton',  gui_Singleton, ...
                   'gui_OpeningFcn', @TA_OpeningFcn, ...
                   'gui_OutputFcn',  @TA_OutputFcn, ...
                   'gui_LayoutFcn',  [] , ...
                   'gui_Callback',   []);
if nargin && ischar(varargin{1})
    gui_State.gui_Callback = str2func(varargin{1});
end

if nargout
    [varargout{1:nargout}] = gui_mainfcn(gui_State, varargin{:});
else
    gui_mainfcn(gui_State, varargin{:});
end
% End initialization code - DO NOT EDIT


% --- Executes just before TA is made visible.
function TA_OpeningFcn(hObject, eventdata, handles, varargin)
```

```
% Create background axes and move them to the background
% Load background image and display it
% Turn the handlevisibility off so that we don't inadvertently
plot into
% the axes again. Also, make the axes invisible
% This function has no output args, see OutputFcn.
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
% varargin   command line arguments to TA (see VARARGIN)

% Choose default command line output for TA
handles.output = hObject;

% Update handles structure
guidata(hObject, handles);

% UIWAIT makes TA wait for user response (see UIRESUME)
% uiwait(handles.figure1);


% --- Outputs from this function are returned to the command line.
function varargout = TA_OutputFcn(hObject, eventdata, handles)
% varargout  cell array for returning output args (see VARARGOUT);
% hObject    handle to figure
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Get default command line output from handles structure
varargout{1} = handles.output;


% --- Executes on selection change in popupmenu3.
function popupmenu3_Callback(hObject, eventdata, handles)
% hObject    handle to popupmenu3 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: contents = cellstr(get(hObject,'String')) returns
popupmenu3 contents as cell array
%        contents{get(hObject,'Value')} returns selected item from
popupmenu3


% --- Executes during object creation, after setting all
properties.
function popupmenu3_CreateFcn(hObject, eventdata, handles)
% hObject    handle to popupmenu3 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
```

```
% handles    empty - handles not created until after all
CreateFcns called

% Hint: popupmenu controls usually have a white background on
Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end


% --- Executes on selection change in popupmenu5.
function popupmenu5_Callback(hObject, eventdata, handles)
% hObject    handle to popupmenu5 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: contents = cellstr(get(hObject,'String')) returns
popupmenu5 contents as cell array
%        contents{get(hObject,'Value')} returns selected item from
popupmenu5


% --- Executes during object creation, after setting all
properties.
function popupmenu5_CreateFcn(hObject, eventdata, handles)
% hObject    handle to popupmenu5 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    empty - handles not created until after all
CreateFcns called

% Hint: popupmenu controls usually have a white background on
Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end


% --- Executes on button press in pushbutton1.
function pushbutton1_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton1 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
T=getappdata(0,'Periode');
DataG=getappdata(0,'G');
DataZ=getappdata(0,'Z');
DataY=getappdata(0,'Y');
%DataDR=getappdata(0,'DR');
%DataF=getappdata(0,'F');
```

```
%DataV=getappdata(0,'V');
%DataMG=getappdata(0,'MG');

% Nilai G
g1=DataG(:,1);g2=DataG(:,2);g3=DataG(:,3);g4=DataG(:,4);g5=DataG(:
,5);g6=DataG(:,6);g7=DataG(:,7);g8=DataG(:,8);g9=DataG(:,9);g10=Da
taG(:,10);g11=DataG(:,11);g12=DataG(:,12);g13=DataG(:,13);g14=Data
G(:,14);g15=DataG(:,15);
% Nilai Z
Z1=DataZ(:,1);Z2=DataZ(:,2);Z3=DataZ(:,3);Z4=DataZ(:,4);Z5=DataZ(:
,5);Z6=DataZ(:,6);Z7=DataZ(:,7);Z8=DataZ(:,8);Z9=DataZ(:,9);Z10=Da
taZ(:,10);Z11=DataZ(:,11);Z12=DataZ(:,12);Z13=DataZ(:,13);Z14=Data
Z(:,14);Z15=DataZ(:,15);
% Nilai Y
Y1=DataY(:,1);Y2=DataY(:,2);Y3=DataY(:,3);Y4=DataY(:,4);Y5=DataY(:
,5);Y6=DataY(:,6);Y7=DataY(:,7);Y8=DataY(:,8);Y9=DataY(:,9);Y10=Da
taY(:,10);Y11=DataY(:,11);Y12=DataY(:,12);Y13=DataY(:,13);Y14=Data
Y(:,14);Y15=DataY(:,15);

xx1=get(handles.popupmenu3,'Value');
grid on
if(xx1==1)
    plot(T,g1)
grid on
elseif (xx1==2)
    plot(T,g2)
grid on
elseif (xx1==3)
    plot(T,g3)
grid on
elseif (xx1==4)
    plot(T,g4)
grid on
elseif (xx1==5)
    plot(T,g5)
grid on
elseif (xx1==6)
    plot(T,g6)
grid on
elseif (xx1==7)
    plot(T,g7)
grid on
elseif (xx1==8)
    plot(T,g8)
grid on
elseif (xx1==9)
    plot(T,g9)
grid on
elseif (xx1==10)
    plot(T,g10)
grid on
elseif (xx1==11)
    plot(T,g11)
grid on
elseif (xx1==12)
    plot(T,g12)
```

```
grid on
elseif (xx1==13)
    plot(T,g13)
grid on
elseif (xx1==14)
    plot(T,g14)
grid on
elseif (xx1==15)
    plot(T,g15)
grid on
elseif(xx1==16)
    plot(T,Z1)
grid on
elseif (xx1==17)
    plot(T,Z2)
grid on
elseif (xx1==18)
    plot(T,Z3)
grid on
elseif (xx1==19)
    plot(T,Z4)
grid on
elseif (xx1==20)
    plot(T,Z5)
grid on
elseif (xx1==21)
    plot(T,Z6)
grid on
elseif (xx1==22)
    plot(T,Z7)
grid on
elseif (xx1==23)
    plot(T,Z8)
grid on
elseif (xx1==24)
    plot(T,Z9)
grid on
elseif (xx1==25)
    plot(T,Z10)
grid on
elseif (xx1==26)
    plot(T,Z11)
grid on
elseif (xx1==27)
    plot(T,Z12)
grid on
elseif (xx1==28)
    plot(T,Z13)
grid on
elseif (xx1==29)
    plot(T,Z14)
grid on
elseif (xx1==30)
    plot(T,Z15)
grid on
elseif(xx1==31)
```

```
    plot(T,Y1)
grid on
elseif (xx1==32)
    plot(T,Y2)
grid on
elseif (xx1==33)
    plot(T,Y3)
grid on
elseif (xx1==34)
    plot(T,Y4)
grid on
elseif (xx1==35)
    plot(T,Y5)
grid on
elseif (xx1==36)
    plot(T,Y6)
grid on
elseif (xx1==37)
    plot(T,Y7)
grid on
elseif (xx1==38)
    plot(T,Y8)
grid on
elseif (xx1==39)
    plot(T,Y9)
grid on
elseif (xx1==40)
    plot(T,Y10)
grid on
elseif (xx1==41)
    plot(T,Y11)
grid on
elseif (xx1==42)
    plot(T,Y12)
grid on
elseif (xx1==43)
    plot(T,Y13)
grid on
elseif (xx1==44)
    plot(T,Y14)
grid on
elseif (xx1==45)
    plot(T,Y15)
grid on
end


% --- Executes on button press in pushbutton2.
function pushbutton2_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton2 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
% Meminta Masukan dari User
myform=guidata(gcbo);
fileName = 'BERATURAN.xlsx';
```

```
datahasil = xlsread(fileName,1,'A2:B16');
set(myform.uitable5,'data',datahasil);


% --- Executes on button press in pushbutton3.
function pushbutton3_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton3 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
%Program Menghitung Eigen Problem Untuk Struktur MDOF
%Menampilkan judul program
h=waitbar(0,'Menghitung Eigen Problem');
n=1;
pjg=2000;
while n <= pjg
n=n+1;
waitbar(n/pjg);
end
disp('Menghitung Eigen Problem')
disp('------------------------')
syms x z1 z2 z3 z4 z5 z6 z7 z8 z9 z10 z11 z12 z13 z14 z15
%Input Massa dan Kekakuan
MassaG=getappdata(0,'Massa');
KekakuanG=getappdata(0,'Stiffness');

%Massa
m1=MassaG(1,:);
m2=MassaG(2,:);
m3=MassaG(3,:);
m4=MassaG(4,:);
m5=MassaG(5,:);
m6=MassaG(6,:);
m7=MassaG(7,:);
m8=MassaG(8,:);
m9=MassaG(9,:);
m10=MassaG(10,:);
m11=MassaG(11,:);
m12=MassaG(12,:);
m13=MassaG(13,:);
m14=MassaG(14,:);
m15=MassaG(15,:);
u1=MassaG(1,:);
Vm=[m1; m2; m3; m4; m5; m6; m7; m8; m9; m10; m11; m12; m13; m14;
m15];
xlswrite('TA.xlsx',Vm,'Massa','B2');

%Kekakuan
k1=KekakuanG(1,:);
k2=KekakuanG(2,:);
k3=KekakuanG(3,:);
k4=KekakuanG(4,:);
k5=KekakuanG(5,:);
k6=KekakuanG(6,:);
k7=KekakuanG(7,:);
k8=KekakuanG(8,:);
```

```
k9=KekakuanG(9,:);
k10=KekakuanG(10,:);
k11=KekakuanG(11,:);
k12=KekakuanG(12,:);
k13=KekakuanG(13,:);
k14=KekakuanG(14,:);
k15=KekakuanG(15,:);
u2=KekakuanG(1,:);
Vk=[k1; k2; k3; k4; k5; k6; k7; k8; k9; k10; k11; k12; k13; k14;
k15];
xlswrite('TA.xlsx',Vk,'Kekakuan','B2');

%Matriks Massa
MatriksM=[m1/u1*x 0 0 0 0 0 0 0 0 0 0 0 0 0 0
    0 m2/u1*x 0 0 0 0 0 0 0 0 0 0 0 0
    0 0 m3/u1*x 0 0 0 0 0 0 0 0 0 0 0
    0 0 0 m4/u1*x 0 0 0 0 0 0 0 0 0 0
    0 0 0 0 m5/u1*x 0 0 0 0 0 0 0 0 0
    0 0 0 0 0 m6/u1*x 0 0 0 0 0 0 0 0
    0 0 0 0 0 0 m7/u1*x 0 0 0 0 0 0 0
    0 0 0 0 0 0 0 m8/u1*x 0 0 0 0 0 0
    0 0 0 0 0 0 0 0 m9/u1*x 0 0 0 0 0
    0 0 0 0 0 0 0 0 0 m10/u1*x 0 0 0 0
    0 0 0 0 0 0 0 0 0 0 m11/u1*x 0 0 0
    0 0 0 0 0 0 0 0 0 0 0 m12/u1*x 0 0
    0 0 0 0 0 0 0 0 0 0 0 0 m13/u1*x 0
    0 0 0 0 0 0 0 0 0 0 0 0 0 m14/u1*x
    0 0 0 0 0 0 0 0 0 0 0 0 0 0 m15/u1*x];
%Matriks Kekakuan
MatriksK=[(k1+k2)/u2 -k2/u2 0 0 0 0 0 0 0 0 0 0 0 0 0
    -k2/u2 (k2+k3)/u2 -k3/u2 0 0 0 0 0 0 0 0 0 0 0
    0 -k3/u2 (k3+k4)/u2 -k4/u2 0 0 0 0 0 0 0 0 0 0
    0 0 -k4/u2 (k4+k5)/u2 -k5/u2 0 0 0 0 0 0 0 0 0
    0 0 0 -k5/u2 (k5+k6)/u2 -k6/u2 0 0 0 0 0 0 0 0
    0 0 0 0 -k6/u2 (k6+k7)/u2 -k7/u2 0 0 0 0 0 0 0
    0 0 0 0 0 -k7/u2 (k7+k8)/u2 -k8/u2 0 0 0 0 0 0
    0 0 0 0 0 0 -k8/u2 (k8+k9)/u2 -k9/u2 0 0 0 0 0
    0 0 0 0 0 0 0 -k9/u2 (k9+k10)/u2 -k10/u2 0 0 0 0
    0 0 0 0 0 0 0 0 -k10/u2 (k10+k11)/u2 -k11/u2 0 0 0
    0 0 0 0 0 0 0 0 0 -k11/u2 (k11+k12)/u2 -k12/u2 0 0
    0 0 0 0 0 0 0 0 0 0 -k12/u2 (k12+k13)/u2 -k13/u2 0
    0 0 0 0 0 0 0 0 0 0 0 -k13/u2 (k13+k14)/u2 -k14/u2
    0 0 0 0 0 0 0 0 0 0 0 0 -k14/u2 (k14+k15)/u2 -k15/u2
    0 0 0 0 0 0 0 0 0 0 0 0 0 -k15/u2 k15/u2];

M1=MatriksK-MatriksM
Determinan=det(M1)
disp('Mencari Nilai Lamda')
format long
Lmd=solve(Determinan,'x');
L=sort(Lmd);
HL=double(L);
x1=HL(1);
x2=HL(2);
x3=HL(3);
x4=HL(4);
```

```
x5=HL(5);
x6=HL(6);
x7=HL(7);
x8=HL(8);
x9=HL(9);
x10=HL(10);
x11=HL(11);
x12=HL(12);
x13=HL(13);
x14=HL(14);
x15=HL(15);
xlswrite('TA.xlsx',HL,'Lamda','A1');

vektor1=[z1; z2; z3; z4; z5; z6; z7; z8; z9; z10; z11; z12; z13;
z14; z15];
M2=M1*vektor1;
disp('Persamaan MODE SHAPE')
disp('--------------------')
Pers1=1
P1=subs(M2(1), z1, Pers1);
Pers2=solve(P1,'z2')
P2=subs(M2(2), {z1 z2}, {Pers1 Pers2});
Pers3=solve(P2,'z3')
P3=subs(M2(3), {z2 z3}, {Pers2 Pers3});
Pers4=solve(P3,'z4')
P4=subs(M2(4), {z3 z4}, {Pers3 Pers4});
Pers5=solve(P4,'z5')
P5=subs(M2(5), {z4 z5}, {Pers4 Pers5});
Pers6=solve(P5,'z6')
P6=subs(M2(6), {z5 z6}, {Pers5 Pers6});
Pers7=solve(P6,'z7')
P7=subs(M2(7), {z6 z7}, {Pers6 Pers7});
Pers8=solve(P7,'z8')
P8=subs(M2(8), {z7 z8}, {Pers7 Pers8});
Pers9=solve(P8,'z9')
P9=subs(M2(9), {z8 z9}, {Pers8 Pers9});
Pers10=solve(P9,'z10')
P10=subs(M2(10), {z9 z10}, {Pers9 Pers10});
Pers11=solve(P10,'z11');
P11=subs(M2(11), {z10 z11}, {Pers10 Pers11});
Pers12=solve(P11,'z12')
P12=subs(M2(12), {z11 z12}, {Pers11 Pers12});
Pers13=solve(P12,'z13')
P13=subs(M2(13), {z12 z13}, {Pers12 Pers13});
Pers14=solve(P13,'z14')
P14=subs(M2(14), {z13 z14}, {Pers13 Pers14});
Pers15=solve(P14,'z15')
% Menghitung Mode Shape1
s1l1=1;
s1l2=subs(Pers2, x, x1);
s1l3=subs(Pers3, x, x1);
s1l4=subs(Pers4, x, x1);
s1l5=subs(Pers5, x, x1);
s1l6=subs(Pers6, x, x1);
s1l7=subs(Pers7, x, x1);
s1l8=subs(Pers8, x, x1);
```

```
s1l9=subs(Pers9, x, x1);
s1l10=subs(Pers10, x, x1);
s1l11=subs(Pers11, x, x1);
s1l12=subs(Pers12, x, x1);
s1l13=subs(Pers13, x, x1);
s1l14=subs(Pers14, x, x1);
s1l15=subs(Pers15, x, x1);
% Menghitung Mode Shape2
s2l1=1;
s2l2=subs(Pers2, x, x2);
s2l3=subs(Pers3, x, x2);
s2l4=subs(Pers4, x, x2);
s2l5=subs(Pers5, x, x2);
s2l6=subs(Pers6, x, x2);
s2l7=subs(Pers7, x, x2);
s2l8=subs(Pers8, x, x2);
s2l9=subs(Pers9, x, x2);
s2l10=subs(Pers10, x, x2);
s2l11=subs(Pers11, x, x2);
s2l12=subs(Pers12, x, x2);
s2l13=subs(Pers13, x, x2);
s2l14=subs(Pers14, x, x2);
s2l15=subs(Pers15, x, x2);
% Menghitung Mode Shape3
s3l1=1;
s3l2=subs(Pers2, x, x3);
s3l3=subs(Pers3, x, x3);
s3l4=subs(Pers4, x, x3);
s3l5=subs(Pers5, x, x3);
s3l6=subs(Pers6, x, x3);
s3l7=subs(Pers7, x, x3);
s3l8=subs(Pers8, x, x3);
s3l9=subs(Pers9, x, x3);
s3l10=subs(Pers10, x, x3);
s3l11=subs(Pers11, x, x3);
s3l12=subs(Pers12, x, x3);
s3l13=subs(Pers13, x, x3);
s3l14=subs(Pers14, x, x3);
s3l15=subs(Pers15, x, x3);
%Menghitung Mode Shape4
s4l1=1;
s4l2=subs(Pers2, x, x4);
s4l3=subs(Pers3, x, x4);
s4l4=subs(Pers4, x, x4);
s4l5=subs(Pers5, x, x4);
s4l6=subs(Pers6, x, x4);
s4l7=subs(Pers7, x, x4);
s4l8=subs(Pers8, x, x4);
s4l9=subs(Pers9, x, x4);
s4l10=subs(Pers10, x, x4);
s4l11=subs(Pers11, x, x4);
s4l12=subs(Pers12, x, x4);
s4l13=subs(Pers13, x, x4);
s4l14=subs(Pers14, x, x4);
s4l15=subs(Pers15, x, x4);
% Menghitung Mode Shape5
```

```
s5l1=1;
s5l2=subs(Pers2, x, x5);
s5l3=subs(Pers3, x, x5);
s5l4=subs(Pers4, x, x5);
s5l5=subs(Pers5, x, x5);
s5l6=subs(Pers6, x, x5);
s5l7=subs(Pers7, x, x5);
s5l8=subs(Pers8, x, x5);
s5l9=subs(Pers9, x, x5);
s5l10=subs(Pers10, x,x5);
s5l11=subs(Pers11, x, x5);
s5l12=subs(Pers12, x, x5);
s5l13=subs(Pers13, x, x5);
s5l14=subs(Pers14, x, x5);
s5l15=subs(Pers15, x,x5);
% Menghitung Mode Shape6
s6l1=1;
s6l2=subs(Pers2, x, x6);
s6l3=subs(Pers3, x, x6);
s6l4=subs(Pers4, x, x6);
s6l5=subs(Pers5, x, x6);
s6l6=subs(Pers6, x, x6);
s6l7=subs(Pers7, x, x6);
s6l8=subs(Pers8, x, x6);
s6l9=subs(Pers9, x, x6);
s6l10=subs(Pers10, x,x6);
s6l11=subs(Pers11, x, x6);
s6l12=subs(Pers12, x, x6);
s6l13=subs(Pers13, x, x6);
s6l14=subs(Pers14, x, x6);
s6l15=subs(Pers15, x,x6);
% Menghitung Mode Shape7
s7l1=1;
s7l2=subs(Pers2, x, x7);
s7l3=subs(Pers3, x, x7);
s7l4=subs(Pers4, x, x7);
s7l5=subs(Pers5, x, x7);
s7l6=subs(Pers6, x, x7);
s7l7=subs(Pers7, x, x7);
s7l8=subs(Pers8, x, x7);
s7l9=subs(Pers9, x, x7);
s7l10=subs(Pers10, x, x7);
s7l11=subs(Pers11, x, x7);
s7l12=subs(Pers12, x, x7);
s7l13=subs(Pers13, x, x7);
s7l14=subs(Pers14, x, x7);
s7l15=subs(Pers15, x, x7);
% Menghitung Mode Shape8
s8l1=1;
s8l2=subs(Pers2, x, x8);
s8l3=subs(Pers3, x, x8);
s8l4=subs(Pers4, x, x8);
s8l5=subs(Pers5, x, x8);
s8l6=subs(Pers6, x, x8);
s8l7=subs(Pers7, x, x8);
s8l8=subs(Pers8, x, x8);
```

```
s8l9=subs(Pers9, x, x8);
s8l10=subs(Pers10, x, x8);
s8l11=subs(Pers11, x, x8);
s8l12=subs(Pers12, x, x8);
s8l13=subs(Pers13, x, x8);
s8l14=subs(Pers14, x, x8);
s8l15=subs(Pers15, x, x8);
% Menghitung Mode Shape9
s9l1=1;
s9l2=subs(Pers2, x, x9);
s9l3=subs(Pers3, x, x9);
s9l4=subs(Pers4, x, x9);
s9l5=subs(Pers5, x, x9);
s9l6=subs(Pers6, x, x9);
s9l7=subs(Pers7, x, x9);
s9l8=subs(Pers8, x, x9);
s9l9=subs(Pers9, x, x9);
s9l10=subs(Pers10, x, x9);
s9l11=subs(Pers11, x, x9);
s9l12=subs(Pers12, x, x9);
s9l13=subs(Pers13, x, x9);
s9l14=subs(Pers14, x, x9);
s9l15=subs(Pers15, x, x9);
% Menghitung Mode Shape10
s10l1=1;
s10l2=subs(Pers2, x, x10);
s10l3=subs(Pers3, x, x10);
s10l4=subs(Pers4, x, x10);
s10l5=subs(Pers5, x, x10);
s10l6=subs(Pers6, x, x10);
s10l7=subs(Pers7, x, x10);
s10l8=subs(Pers8, x, x10);
s10l9=subs(Pers9, x, x10);
s10l10=subs(Pers10, x, x10);
s10l11=subs(Pers11, x, x10);
s10l12=subs(Pers12, x, x10);
s10l13=subs(Pers13, x, x10);
s10l14=subs(Pers14, x, x10);
s10l15=subs(Pers15, x, x10);
% Menghitung Mode Shape11
s11l1=1;
s11l2=subs(Pers2, x, x11);
s11l3=subs(Pers3, x, x11);
s11l4=subs(Pers4, x, x11);
s11l5=subs(Pers5, x, x11);
s11l6=subs(Pers6, x, x11);
s11l7=subs(Pers7, x, x11);
s11l8=subs(Pers8, x, x11);
s11l9=subs(Pers9, x, x11);
s11l10=subs(Pers10, x, x11);
s11l11=subs(Pers11, x, x11);
s11l12=subs(Pers12, x, x11);
s11l13=subs(Pers13, x, x11);
s11l14=subs(Pers14, x, x11);
s11l15=subs(Pers15, x, x11);
% Menghitung Mode Shape12
```

```
s12l1=1;
s12l2=subs(Pers2, x, x12);
s12l3=subs(Pers3, x, x12);
s12l4=subs(Pers4, x, x12);
s12l5=subs(Pers5, x, x12);
s12l6=subs(Pers6, x, x12);
s12l7=subs(Pers7, x, x12);
s12l8=subs(Pers8, x, x12);
s12l9=subs(Pers9, x, x12);
s12l10=subs(Pers10, x, x12);
s12l11=subs(Pers11, x, x12);
s12l12=subs(Pers12, x, x12);
s12l13=subs(Pers13, x, x12);
s12l14=subs(Pers14, x, x12);
s12l15=subs(Pers15, x, x12);
% Menghitung Mode Shape13
s13l1=1;
s13l2=subs(Pers2, x, x13);
s13l3=subs(Pers3, x, x13);
s13l4=subs(Pers4, x, x13);
s13l5=subs(Pers5, x, x13);
s13l6=subs(Pers6, x, x13);
s13l7=subs(Pers7, x, x13);
s13l8=subs(Pers8, x, x13);
s13l9=subs(Pers9, x, x13);
s13l10=subs(Pers10, x, x13);
s13l11=subs(Pers11, x, x13);
s13l12=subs(Pers12, x, x13);
s13l13=subs(Pers13, x, x13);
s13l14=subs(Pers14, x, x13);
s13l15=subs(Pers15, x, x13);
% Menghitung Mode Shape14
s14l1=1;
s14l2=subs(Pers2, x, x14);
s14l3=subs(Pers3, x, x14);
s14l4=subs(Pers4, x, x14);
s14l5=subs(Pers5, x, x14);
s14l6=subs(Pers6, x, x14);
s14l7=subs(Pers7, x, x14);
s14l8=subs(Pers8, x, x14);
s14l9=subs(Pers9, x, x14);
s14l10=subs(Pers10, x, x14);
s14l11=subs(Pers11, x, x14);
s14l12=subs(Pers12, x, x14);
s14l13=subs(Pers13, x, x14);
s14l14=subs(Pers14, x, x14);
s14l15=subs(Pers15, x, x14);
% Menghitung Mode Shape15
s15l1=1;
s15l2=subs(Pers2, x, x15);
s15l3=subs(Pers3, x, x15);
s15l4=subs(Pers4, x, x15);
s15l5=subs(Pers5, x, x15);
s15l6=subs(Pers6, x, x15);
s15l7=subs(Pers7, x, x15);
s15l8=subs(Pers8, x, x15);
```

```
s15l9=subs(Pers9, x, x15);
s15l10=subs(Pers10, x, x15);
s15l11=subs(Pers11, x, x15);
s15l12=subs(Pers12, x, x15);
s15l13=subs(Pers13, x, x15);
s15l14=subs(Pers14, x, x15);
s15l15=subs(Pers15, x, x15);

disp('Matriks MODE SHAPE')
disp('------------------------------')
M3=[s1l1 s2l1 s3l1 s4l1 s5l1 s6l1 s7l1 s8l1 s9l1 s10l1 s11l1 s12l1
s13l1 s14l1 s15l1;
    s1l2 s2l2 s3l2 s4l2 s5l2 s6l2 s7l2 s8l2 s9l2 s10l2 s11l2 s12l2
s13l2 s14l2 s15l2;
    s1l3 s2l3 s3l3 s4l3 s5l3 s6l3 s7l3 s8l3 s9l3 s10l3 s11l3 s12l3
s13l3 s14l3 s15l3;
    s1l4 s2l4 s3l4 s4l4 s5l4 s6l4 s7l4 s8l4 s9l4 s10l4 s11l4 s12l4
s13l4 s14l4 s15l4;
    s1l5 s2l5 s3l5 s4l5 s5l5 s6l5 s7l5 s8l5 s9l5 s10l5 s11l5 s12l5
s13l5 s14l5 s15l5;
    s1l6 s2l6 s3l6 s4l6 s5l6 s6l6 s7l6 s8l6 s9l6 s10l6 s11l6 s12l6
s13l6 s14l6 s15l6;
    s1l7 s2l7 s3l7 s4l7 s5l7 s6l7 s7l7 s8l7 s9l7 s10l7 s11l7 s12l7
s13l7 s14l7 s15l7;
    s1l8 s2l8 s3l8 s4l8 s5l8 s6l8 s7l8 s8l8 s9l8 s10l8 s11l8 s12l8
s13l8 s14l8 s15l8;
    s1l9 s2l9 s3l9 s4l9 s5l9 s6l9 s7l9 s8l9 s9l9 s10l9 s11l9 s12l9
s13l9 s14l9 s15l9;
    s1l10 s2l10 s3l10 s4l10 s5l10 s6l10 s7l10 s8l10 s9l10 s10l10
s11l10 s12l10 s13l10 s14l10 s15l10;
    s1l11 s2l11 s3l11 s4l11 s5l11 s6l11 s7l11 s8l11 s9l11 s10l11
s11l11 s12l11 s13l11 s14l11 s15l11;
    s1l12 s2l12 s3l12 s4l12 s5l12 s6l12 s7l12 s8l12 s9l12 s10l12
s11l12 s12l12 s13l12 s14l12 s15l12;
    s1l13 s2l13 s3l13 s4l13 s5l13 s6l13 s7l13 s8l13 s9l13 s10l13
s11l13 s12l13 s13l13 s14l13 s15l13;
    s1l14 s2l14 s3l14 s4l14 s5l14 s6l14 s7l14 s8l14 s9l14 s10l14
s11l14 s12l14 s13l14 s14l14 s15l14;
    s1l15 s2l15 s3l15 s4l15 s5l15 s6l15 s7l15 s8l15 s9l15 s10l15
s11l15 s12l15 s13l15 s14l15 s15l15];
NilaiMS=double(M3)
%menyimpan data MS
setappdata(0,'MS',NilaiMS);
xlswrite('TA.xlsx',NilaiMS,'Mode shape','A1');
close (h)
h=waitbar(0,'Menghitung Orthogonal');
n=1;
pjg=1000;
while n <= pjg
n=n+1;
waitbar(n/pjg);
end
disp('Menghitung HUBUNGAN ORTHOGONAL')
disp('------------------------------')
matriks3=[m1/u1 0 0 0 0 0 0 0 0 0 0 0 0 0 0;
    0 m2/u1 0 0 0 0 0 0 0 0 0 0 0 0 0;
```

```
    0 0 m3/u1 0 0 0 0 0 0 0 0 0 0 0;
    0 0 0 m4/u1 0 0 0 0 0 0 0 0 0 0;
    0 0 0 0 m5/u1 0 0 0 0 0 0 0 0 0;
    0 0 0 0 0 m6/u1 0 0 0 0 0 0 0 0;
    0 0 0 0 0 0 m7/u1 0 0 0 0 0 0 0;
    0 0 0 0 0 0 0 m8/u1 0 0 0 0 0 0;
    0 0 0 0 0 0 0 0 m9/u1 0 0 0 0 0;
    0 0 0 0 0 0 0 0 0 m10/u1 0 0 0 0;
    0 0 0 0 0 0 0 0 0 0 m11/u1 0 0 0;
    0 0 0 0 0 0 0 0 0 0 0 m12/u1 0 0;
    0 0 0 0 0 0 0 0 0 0 0 0 m13/u1 0;
    0 0 0 0 0 0 0 0 0 0 0 0 0 m14/u1;
    0 0 0 0 0 0 0 0 0 0 0 0 0 0 m15/u1];
%Hubungan orthothogonal mode-1
o11=M3(:,1).'*matriks3*M3(:,1);
ortho11=fix(o11);
o12=M3(:,1).'*matriks3*M3(:,2);
ortho12=fix(o12);
o13=M3(:,1).'*matriks3*M3(:,3);
ortho13=fix(o13);
o14=M3(:,1).'*matriks3*M3(:,4);
ortho14=fix(o14);
o15=M3(:,1).'*matriks3*M3(:,5);
ortho15=fix(o15);
o16=M3(:,1).'*matriks3*M3(:,6);
ortho16=fix(o16);
o17=M3(:,1).'*matriks3*M3(:,7);
ortho17=fix(o17);
o18=M3(:,1).'*matriks3*M3(:,8);
ortho18=fix(o18);
o19=M3(:,1).'*matriks3*M3(:,9);
ortho19=fix(o19);
o110=M3(:,1).'*matriks3*M3(:,10);
ortho110=fix(o110);
o111=M3(:,1).'*matriks3*M3(:,11);
ortho111=fix(o111);
o112=M3(:,1).'*matriks3*M3(:,12);
ortho112=fix(o112);
o113=M3(:,1).'*matriks3*M3(:,13);
ortho113=fix(o113);
o114=M3(:,1).'*matriks3*M3(:,14);
ortho114=fix(o114);
o115=M3(:,1).'*matriks3*M3(:,15);
ortho115=fix(o115);

%Hubungan orthothogonal mode-2
o21=M3(:,2).'*matriks3*M3(:,1);
ortho21=fix(o21);
o22=M3(:,2).'*matriks3*M3(:,2);
ortho22=fix(o22);
o23=M3(:,2).'*matriks3*M3(:,3);
ortho23=fix(o23);
o24=M3(:,2).'*matriks3*M3(:,4);
ortho24=fix(o24);
o25=M3(:,2).'*matriks3*M3(:,5);
ortho25=fix(o25);
```

```
o26=M3(:,2).'*matriks3*M3(:,6);
ortho26=fix(o26);
o27=M3(:,2).'*matriks3*M3(:,7);
ortho27=fix(o27);
o28=M3(:,2).'*matriks3*M3(:,8);
ortho28=fix(o28);
o29=M3(:,2).'*matriks3*M3(:,9);
ortho29=fix(o29);
o210=M3(:,2).'*matriks3*M3(:,10);
ortho210=fix(o210);
o211=M3(:,2).'*matriks3*M3(:,11);
ortho211=fix(o211);
o212=M3(:,2).'*matriks3*M3(:,12);
ortho212=fix(o212);
o213=M3(:,2).'*matriks3*M3(:,13);
ortho213=fix(o213);
o214=M3(:,2).'*matriks3*M3(:,14);
ortho214=fix(o214);
o215=M3(:,2).'*matriks3*M3(:,15);
ortho215=fix(o215);

%Hubungan orthothogonal mode-3
o31=M3(:,3).'*matriks3*M3(:,1);
ortho31=fix(o31);
o32=M3(:,3).'*matriks3*M3(:,2);
ortho32=fix(o32);
o33=M3(:,3).'*matriks3*M3(:,3);
ortho33=fix(o33);
o34=M3(:,3).'*matriks3*M3(:,4);
ortho34=fix(o34);
o35=M3(:,3).'*matriks3*M3(:,5);
ortho35=fix(o35);
o36=M3(:,3).'*matriks3*M3(:,6);
ortho36=fix(o36);
o37=M3(:,3).'*matriks3*M3(:,7);
ortho37=fix(o37);
o38=M3(:,3).'*matriks3*M3(:,8);
ortho38=fix(o38);
o39=M3(:,3).'*matriks3*M3(:,9);
ortho39=fix(o39);
o310=M3(:,3).'*matriks3*M3(:,10);
ortho310=fix(o310);
o311=M3(:,3).'*matriks3*M3(:,11);
ortho311=fix(o311);
o312=M3(:,3).'*matriks3*M3(:,12);
ortho312=fix(o312);
o313=M3(:,3).'*matriks3*M3(:,13);
ortho313=fix(o313);
o314=M3(:,3).'*matriks3*M3(:,14);
ortho314=fix(o314);
o315=M3(:,3).'*matriks3*M3(:,15);
ortho315=fix(o315);

%Hubungan orthothogonal mode-4
o41=M3(:,4).'*matriks3*M3(:,1);
ortho41=fix(o41);
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o42=M3(:,4).'*matriks3*M3(:,2);
ortho42=fix(o42);
o43=M3(:,4).'*matriks3*M3(:,3);
ortho43=fix(o43);
o44=M3(:,4).'*matriks3*M3(:,4);
ortho44=fix(o44);
o45=M3(:,4).'*matriks3*M3(:,5);
ortho45=fix(o45);
o46=M3(:,4).'*matriks3*M3(:,6);
ortho46=fix(o46);
o47=M3(:,4).'*matriks3*M3(:,7);
ortho47=fix(o47);
o48=M3(:,4).'*matriks3*M3(:,8);
ortho48=fix(o48);
o49=M3(:,4).'*matriks3*M3(:,9);
ortho49=fix(o49);
o410=M3(:,4).'*matriks3*M3(:,10);
ortho410=fix(o410);
o411=M3(:,4).'*matriks3*M3(:,11);
ortho411=fix(o411);
o412=M3(:,4).'*matriks3*M3(:,12);
ortho412=fix(o412);
o413=M3(:,4).'*matriks3*M3(:,13);
ortho413=fix(o413);
o414=M3(:,4).'*matriks3*M3(:,14);
ortho414=fix(o414);
o415=M3(:,4).'*matriks3*M3(:,15);
ortho415=fix(o415);

%Hubungan orthothogonal mode-5
o51=M3(:,5).'*matriks3*M3(:,1);
ortho51=fix(o51);
o52=M3(:,5).'*matriks3*M3(:,2);
ortho52=fix(o52);
o53=M3(:,5).'*matriks3*M3(:,3);
ortho53=fix(o53);
o54=M3(:,5).'*matriks3*M3(:,4);
ortho54=fix(o54);
o55=M3(:,5).'*matriks3*M3(:,5);
ortho55=fix(o55);
o56=M3(:,5).'*matriks3*M3(:,6);
ortho56=fix(o56);
o57=M3(:,5).'*matriks3*M3(:,7);
ortho57=fix(o57);
o58=M3(:,5).'*matriks3*M3(:,8);
ortho58=fix(o58);
o59=M3(:,5).'*matriks3*M3(:,9);
ortho59=fix(o59);
o510=M3(:,5).'*matriks3*M3(:,10);
ortho510=fix(o510);
o511=M3(:,5).'*matriks3*M3(:,11);
ortho511=fix(o511);
o512=M3(:,5).'*matriks3*M3(:,12);
ortho512=fix(o512);
o513=M3(:,5).'*matriks3*M3(:,13);
ortho513=fix(o513);
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```
o514=M3(:,5).'*matriks3*M3(:,14);
ortho514=fix(o514);
o515=M3(:,5).'*matriks3*M3(:,15);
ortho515=fix(o515);

%Hubungan orthothogonal mode-6
o61=M3(:,6).'*matriks3*M3(:,1);
ortho61=fix(o61);
o62=M3(:,6).'*matriks3*M3(:,2);
ortho62=fix(o62);
o63=M3(:,6).'*matriks3*M3(:,3);
ortho63=fix(o63);
o64=M3(:,6).'*matriks3*M3(:,4);
ortho64=fix(o64);
o65=M3(:,6).'*matriks3*M3(:,5);
ortho65=fix(o65);
o66=M3(:,6).'*matriks3*M3(:,6);
ortho66=fix(o66);
o67=M3(:,6).'*matriks3*M3(:,7);
ortho67=fix(o67);
o68=M3(:,6).'*matriks3*M3(:,8);
ortho68=fix(o68);
o69=M3(:,6).'*matriks3*M3(:,9);
ortho69=fix(o69);
o610=M3(:,6).'*matriks3*M3(:,10);
ortho610=fix(o610);
o611=M3(:,6).'*matriks3*M3(:,11);
ortho611=fix(o611);
o612=M3(:,6).'*matriks3*M3(:,12);
ortho612=fix(o612);
o613=M3(:,6).'*matriks3*M3(:,13);
ortho613=fix(o613);
o614=M3(:,6).'*matriks3*M3(:,14);
ortho614=fix(o614);
o615=M3(:,6).'*matriks3*M3(:,15);
ortho615=fix(o615);

%Hubungan orthothogonal mode-7
o71=M3(:,7).'*matriks3*M3(:,1);
ortho71=fix(o71);
o72=M3(:,7).'*matriks3*M3(:,2);
ortho72=fix(o72);
o73=M3(:,7).'*matriks3*M3(:,3);
ortho73=fix(o73);
o74=M3(:,7).'*matriks3*M3(:,4);
ortho74=fix(o74);
o75=M3(:,7).'*matriks3*M3(:,5);
ortho75=fix(o75);
o76=M3(:,7).'*matriks3*M3(:,6);
ortho76=fix(o76);
o77=M3(:,7).'*matriks3*M3(:,7);
ortho77=fix(o77);
o78=M3(:,7).'*matriks3*M3(:,8);
ortho78=fix(o78);
o79=M3(:,7).'*matriks3*M3(:,9);
ortho79=fix(o79);
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```
o710=M3(:,7).'*matriks3*M3(:,10);
ortho710=fix(o710);
o711=M3(:,7).'*matriks3*M3(:,11);
ortho711=fix(o711);
o712=M3(:,7).'*matriks3*M3(:,12);
ortho712=fix(o712);
o713=M3(:,7).'*matriks3*M3(:,13);
ortho713=fix(o713);
o714=M3(:,7).'*matriks3*M3(:,14);
ortho714=fix(o714);
o715=M3(:,7).'*matriks3*M3(:,15);
ortho715=fix(o715);

%Hubungan orthothogonal mode-8
o81=M3(:,8).'*matriks3*M3(:,1);
ortho81=fix(o81);
o82=M3(:,8).'*matriks3*M3(:,2);
ortho82=fix(o82);
o83=M3(:,8).'*matriks3*M3(:,3);
ortho83=fix(o83);
o84=M3(:,8).'*matriks3*M3(:,4);
ortho84=fix(o84);
o85=M3(:,8).'*matriks3*M3(:,5);
ortho85=fix(o85);
o86=M3(:,8).'*matriks3*M3(:,6);
ortho86=fix(o86);
o87=M3(:,8).'*matriks3*M3(:,7);
ortho87=fix(o87);
o88=M3(:,8).'*matriks3*M3(:,8);
ortho88=fix(o88);
o89=M3(:,8).'*matriks3*M3(:,9);
ortho89=fix(o89);
o810=M3(:,8).'*matriks3*M3(:,10);
ortho810=fix(o810);
o811=M3(:,8).'*matriks3*M3(:,11);
ortho811=fix(o811);
o812=M3(:,8).'*matriks3*M3(:,12);
ortho812=fix(o812);
o813=M3(:,8).'*matriks3*M3(:,13);
ortho813=fix(o813);
o814=M3(:,8).'*matriks3*M3(:,14);
ortho814=fix(o814);
o815=M3(:,8).'*matriks3*M3(:,15);
ortho815=fix(o815);

%Hubungan orthothogonal mode-9
o91=M3(:,9).'*matriks3*M3(:,1);
ortho91=fix(o91);
o92=M3(:,9).'*matriks3*M3(:,2);
ortho92=fix(o92);
o93=M3(:,9).'*matriks3*M3(:,3);
ortho93=fix(o93);
o94=M3(:,9).'*matriks3*M3(:,4);
ortho94=fix(o94);
o95=M3(:,9).'*matriks3*M3(:,5);
ortho95=fix(o95);
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```
o96=M3(:,9).'*matriks3*M3(:,6);
ortho96=fix(o96);
o97=M3(:,9).'*matriks3*M3(:,7);
ortho97=fix(o97);
o98=M3(:,9).'*matriks3*M3(:,8);
ortho98=fix(o98);
o99=M3(:,9).'*matriks3*M3(:,9);
ortho99=fix(o99);
o910=M3(:,9).'*matriks3*M3(:,10);
ortho910=fix(o910);
o911=M3(:,9).'*matriks3*M3(:,11);
ortho911=fix(o911);
o912=M3(:,9).'*matriks3*M3(:,12);
ortho912=fix(o912);
o913=M3(:,9).'*matriks3*M3(:,13);
ortho913=fix(o913);
o914=M3(:,9).'*matriks3*M3(:,14);
ortho914=fix(o914);
o915=M3(:,9).'*matriks3*M3(:,15);
ortho915=fix(o915);

%Hubungan orthothogonal mode-10
o101=M3(:,10).'*matriks3*M3(:,1);
ortho101=fix(o101);
o102=M3(:,10).'*matriks3*M3(:,2);
ortho102=fix(o102);
o103=M3(:,10).'*matriks3*M3(:,3);
ortho103=fix(o103);
o104=M3(:,10).'*matriks3*M3(:,4);
ortho104=fix(o104);
o105=M3(:,10).'*matriks3*M3(:,5);
ortho105=fix(o105);
o106=M3(:,10).'*matriks3*M3(:,6);
ortho106=fix(o106);
o107=M3(:,10).'*matriks3*M3(:,7);
ortho107=fix(o107);
o108=M3(:,10).'*matriks3*M3(:,8);
ortho108=fix(o108);
o109=M3(:,10).'*matriks3*M3(:,9);
ortho109=fix(o109);
o1010=M3(:,10).'*matriks3*M3(:,10);
ortho1010=fix(o1010);
o1011=M3(:,10).'*matriks3*M3(:,11);
ortho1011=fix(o1011);
o1012=M3(:,10).'*matriks3*M3(:,12);
ortho1012=fix(o1012);
o1013=M3(:,10).'*matriks3*M3(:,13);
ortho1013=fix(o1013);
o1014=M3(:,10).'*matriks3*M3(:,14);
ortho1014=fix(o1014);
o1015=M3(:,10).'*matriks3*M3(:,15);
ortho1015=fix(o1015);

%Hubungan orthothogonal mode-11
o111=M3(:,11).'*matriks3*M3(:,1);
ortho111=fix(o111);
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o112=M3(:,11).'*matriks3*M3(:,2);
ortho112=fix(o112);
o113=M3(:,11).'*matriks3*M3(:,3);
ortho113=fix(o113);
o114=M3(:,11).'*matriks3*M3(:,4);
ortho114=fix(o114);
o115=M3(:,11).'*matriks3*M3(:,5);
ortho115=fix(o115);
o116=M3(:,11).'*matriks3*M3(:,6);
ortho116=fix(o116);
o117=M3(:,11).'*matriks3*M3(:,7);
ortho117=fix(o117);
o118=M3(:,11).'*matriks3*M3(:,8);
ortho118=fix(o118);
o119=M3(:,11).'*matriks3*M3(:,9);
ortho119=fix(o119);
o1110=M3(:,11).'*matriks3*M3(:,10);
ortho1110=fix(o1110);
o1111=M3(:,11).'*matriks3*M3(:,11);
ortho1111=fix(o1111);
o1112=M3(:,11).'*matriks3*M3(:,12);
ortho1112=fix(o1112);
o1113=M3(:,11).'*matriks3*M3(:,13);
ortho1113=fix(o1113);
o1114=M3(:,11).'*matriks3*M3(:,14);
ortho1114=fix(o1114);
o1115=M3(:,11).'*matriks3*M3(:,15);
ortho1115=fix(o1115);

%Hubungan orthothogonal mode-12
o121=M3(:,12).'*matriks3*M3(:,1);
ortho121=fix(o121);
o122=M3(:,12).'*matriks3*M3(:,2);
ortho122=fix(o122);
o123=M3(:,12).'*matriks3*M3(:,3);
ortho123=fix(o123);
o124=M3(:,12).'*matriks3*M3(:,4);
ortho124=fix(o124);
o125=M3(:,12).'*matriks3*M3(:,5);
ortho125=fix(o125);
o126=M3(:,12).'*matriks3*M3(:,6);
ortho126=fix(o126);
o127=M3(:,12).'*matriks3*M3(:,7);
ortho127=fix(o127);
o128=M3(:,12).'*matriks3*M3(:,8);
ortho128=fix(o128);
o129=M3(:,12).'*matriks3*M3(:,9);
ortho129=fix(o129);
o1210=M3(:,12).'*matriks3*M3(:,10);
ortho1210=fix(o1210);
o1211=M3(:,12).'*matriks3*M3(:,11);
ortho1211=fix(o1211);
o1212=M3(:,12).'*matriks3*M3(:,12);
ortho1212=fix(o1212);
o1213=M3(:,12).'*matriks3*M3(:,13);
ortho1213=fix(o1213);
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o1214=M3(:,12).'*matriks3*M3(:,14);
ortho1214=fix(o1214);
o1215=M3(:,12).'*matriks3*M3(:,15);
ortho1215=fix(o1215);

%Hubungan orthothogonal mode-13
o131=M3(:,13).'*matriks3*M3(:,1);
ortho131=fix(o131);
o132=M3(:,13).'*matriks3*M3(:,2);
ortho132=fix(o132);
o133=M3(:,13).'*matriks3*M3(:,3);
ortho133=fix(o133);
o134=M3(:,13).'*matriks3*M3(:,4);
ortho134=fix(o134);
o135=M3(:,13).'*matriks3*M3(:,5);
ortho135=fix(o135);
o136=M3(:,13).'*matriks3*M3(:,6);
ortho136=fix(o136);
o137=M3(:,13).'*matriks3*M3(:,7);
ortho137=fix(o137);
o138=M3(:,13).'*matriks3*M3(:,8);
ortho138=fix(o138);
o139=M3(:,13).'*matriks3*M3(:,9);
ortho139=fix(o139);
o1310=M3(:,13).'*matriks3*M3(:,10);
ortho1310=fix(o1310);
o1311=M3(:,13).'*matriks3*M3(:,11);
ortho1311=fix(o1311);
o1312=M3(:,13).'*matriks3*M3(:,12);
ortho1312=fix(o1312);
o1313=M3(:,13).'*matriks3*M3(:,13);
ortho1313=fix(o1313);
o1314=M3(:,13).'*matriks3*M3(:,14);
ortho1314=fix(o1314);
o1315=M3(:,13).'*matriks3*M3(:,15);
ortho1315=fix(o1315);

%Hubungan orthothogonal mode-14
o141=M3(:,14).'*matriks3*M3(:,1);
ortho141=fix(o141);
o142=M3(:,14).'*matriks3*M3(:,2);
ortho142=fix(o142);
o143=M3(:,14).'*matriks3*M3(:,3);
ortho143=fix(o143);
o144=M3(:,14).'*matriks3*M3(:,4);
ortho144=fix(o144);
o145=M3(:,14).'*matriks3*M3(:,5);
ortho145=fix(o145);
o146=M3(:,14).'*matriks3*M3(:,6);
ortho146=fix(o146);
o147=M3(:,14).'*matriks3*M3(:,7);
ortho147=fix(o147);
o148=M3(:,14).'*matriks3*M3(:,8);
ortho148=fix(o148);
o149=M3(:,14).'*matriks3*M3(:,9);
ortho149=fix(o149);
```

```
o1410=M3(:,14).'*matriks3*M3(:,10);
ortho1410=fix(o1410);
o1411=M3(:,14).'*matriks3*M3(:,11);
ortho1411=fix(o1411);
o1412=M3(:,14).'*matriks3*M3(:,12);
ortho1412=fix(o1412);
o1413=M3(:,14).'*matriks3*M3(:,13);
ortho1413=fix(o1413);
o1414=M3(:,14).'*matriks3*M3(:,14);
ortho1414=fix(o1414);
o1415=M3(:,14).'*matriks3*M3(:,15);
ortho1415=fix(o1415);

%Hubungan orthothogonal mode-15
o151=M3(:,15).'*matriks3*M3(:,1);
ortho151=fix(o151);
o152=M3(:,15).'*matriks3*M3(:,2);
ortho152=fix(o152);
o153=M3(:,15).'*matriks3*M3(:,3);
ortho153=fix(o153);
o154=M3(:,15).'*matriks3*M3(:,4);
ortho154=fix(o154);
o155=M3(:,15).'*matriks3*M3(:,5);
ortho155=fix(o155);
o156=M3(:,15).'*matriks3*M3(:,6);
ortho156=fix(o156);
o157=M3(:,15).'*matriks3*M3(:,7);
ortho157=fix(o157);
o158=M3(:,15).'*matriks3*M3(:,8);
ortho158=fix(o158);
o159=M3(:,15).'*matriks3*M3(:,9);
ortho159=fix(o159);
o1510=M3(:,15).'*matriks3*M3(:,10);
ortho1510=fix(o1510);
o1511=M3(:,15).'*matriks3*M3(:,11);
ortho1511=fix(o1511);
o1512=M3(:,15).'*matriks3*M3(:,12);
ortho1512=fix(o1512);
o1513=M3(:,15).'*matriks3*M3(:,13);
ortho1513=fix(o1513);
o1514=M3(:,15).'*matriks3*M3(:,14);
ortho1514=fix(o1514);
o1515=M3(:,15).'*matriks3*M3(:,15);
ortho1515=fix(o1515);
M4=double([ortho11 ortho12 ortho13 ortho14 ortho15 ortho16 ortho17
ortho18 ortho19 ortho110 ortho111 ortho112 ortho113 ortho114
ortho115;
    ortho21 ortho22 ortho23 ortho24 ortho25 ortho26 ortho27
ortho28 ortho29 ortho210 ortho211 ortho212 ortho213 ortho214
ortho215;
    ortho31 ortho32 ortho33 ortho34 ortho35 ortho36 ortho37
ortho38 ortho39 ortho310 ortho311 ortho312 ortho313 ortho314
ortho315;
    ortho41 ortho42 ortho43 ortho44 ortho45 ortho46 ortho47
ortho48 ortho49 ortho410 ortho411 ortho412 ortho413 ortho414
ortho415;
```

```
    ortho51 ortho52 ortho53 ortho54 ortho55 ortho56 ortho57
ortho58 ortho59 ortho510 ortho511 ortho512 ortho513 ortho514
ortho515;
    ortho61 ortho62 ortho63 ortho64 ortho65 ortho66 ortho67
ortho68 ortho69 ortho610 ortho611 ortho612 ortho613 ortho614
ortho615;
    ortho71 ortho72 ortho73 ortho74 ortho75 ortho76 ortho77
ortho78 ortho79 ortho710 ortho711 ortho712 ortho713 ortho714
ortho715;
    ortho81 ortho82 ortho83 ortho84 ortho85 ortho86 ortho87
ortho88 ortho89 ortho810 ortho811 ortho812 ortho813 ortho814
ortho815;
    ortho91 ortho92 ortho93 ortho94 ortho95 ortho96 ortho97
ortho98 ortho99 ortho910 ortho911 ortho912 ortho913 ortho914
ortho915;
    ortho101 ortho102 ortho103 ortho104 ortho105 ortho106 ortho107
ortho108 ortho109 ortho1010 ortho1011 ortho1012 ortho1013
ortho1014 ortho1015;
    ortho111 ortho112 ortho113 ortho114 ortho115 ortho116 ortho117
ortho118 ortho119 ortho1110 ortho1111 ortho1112 ortho1113
ortho1114 ortho1115;
    ortho121 ortho122 ortho123 ortho124 ortho125 ortho126 ortho127
ortho128 ortho129 ortho1210 ortho1211 ortho1212 ortho1213
ortho1214 ortho1215;
    ortho131 ortho132 ortho133 ortho134 ortho135 ortho136 ortho137
ortho138 ortho139 ortho1310 ortho1311 ortho1312 ortho1313
ortho1314 ortho1315;
    ortho141 ortho142 ortho143 ortho144 ortho145 ortho146 ortho147
ortho148 ortho149 ortho1410 ortho1411 ortho1412 ortho1413
ortho1414 ortho1415;
    ortho151 ortho152 ortho153 ortho154 ortho155 ortho156 ortho157
ortho158 ortho159 ortho1510 ortho1511 ortho1512 ortho1513
ortho1514 ortho1515]);
xlswrite('TA.xlsx',M4,'Orthogonal','A1')
close (h)
h=waitbar(0,'Menghitung Analisis Dinamik');
n=1;
pjg=2000;
while n <= pjg
n=n+1;
waitbar(n/pjg);
end
disp('MODAL ANALYSIS')
disp('--------------')
A=[m1 0 0 0 0 0 0 0 0 0 0 0 0 0 0
    0 m2 0 0 0 0 0 0 0 0 0 0 0 0 0
    0 0 m3 0 0 0 0 0 0 0 0 0 0 0 0
    0 0 0 m4 0 0 0 0 0 0 0 0 0 0 0
    0 0 0 0 m5 0 0 0 0 0 0 0 0 0 0
    0 0 0 0 0 m6 0 0 0 0 0 0 0 0 0
    0 0 0 0 0 0 m7 0 0 0 0 0 0 0 0
    0 0 0 0 0 0 0 m8 0 0 0 0 0 0 0
    0 0 0 0 0 0 0 0 m9 0 0 0 0 0 0
    0 0 0 0 0 0 0 0 0 m10 0 0 0 0 0
    0 0 0 0 0 0 0 0 0 0 m11 0 0 0 0
    0 0 0 0 0 0 0 0 0 0 0 m12 0 0 0
```

```
    0 0 0 0 0 0 0 0 0 0 0 0 m13 0 0
    0 0 0 0 0 0 0 0 0 0 0 0 0 m14 0
    0 0 0 0 0 0 0 0 0 0 0 0 0 0 m15];
%Partisipasi Setiap Mode
PM1=M3(:,1)'*A*[1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1];
PM2=M3(:,2)'*A*[1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1];
PM3=M3(:,3)'*A*[1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1];
PM4=M3(:,4)'*A*[1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1];
PM5=M3(:,5)'*A*[1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1];
PM6=M3(:,6)'*A*[1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1];
PM7=M3(:,7)'*A*[1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1];
PM8=M3(:,8)'*A*[1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1];
PM9=M3(:,9)'*A*[1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1];
PM10=M3(:,10)'*A*[1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1];
PM11=M3(:,11)'*A*[1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1];
PM12=M3(:,12)'*A*[1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1];
PM13=M3(:,13)'*A*[1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1];
PM14=M3(:,14)'*A*[1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1];
PM15=M3(:,15)'*A*[1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1; 1];

MM1=M3(:,1)'*matriks3*M3(:,1)*u1;
MM2=M3(:,2)'*matriks3*M3(:,2)*u1;
MM3=M3(:,3)'*matriks3*M3(:,3)*u1;
MM4=M3(:,4)'*matriks3*M3(:,4)*u1;
MM5=M3(:,5)'*matriks3*M3(:,5)*u1;
MM6=M3(:,6)'*matriks3*M3(:,6)*u1;
MM7=M3(:,7)'*matriks3*M3(:,7)*u1;
MM8=M3(:,8)'*matriks3*M3(:,8)*u1;
MM9=M3(:,9)'*matriks3*M3(:,9)*u1;
MM10=M3(:,10)'*matriks3*M3(:,10)*u1;
MM11=M3(:,11)'*matriks3*M3(:,11)*u1;
MM12=M3(:,12)'*matriks3*M3(:,12)*u1;
MM13=M3(:,13)'*matriks3*M3(:,13)*u1;
MM14=M3(:,14)'*matriks3*M3(:,14)*u1;
MM15=M3(:,15)'*matriks3*M3(:,15)*u1;
r1=PM1/MM1;
r2=PM2/MM2;
r3=PM3/MM3;
r4=PM4/MM4;
r5=PM5/MM5;
r6=PM6/MM6;
r7=PM7/MM7;
r8=PM8/MM8;
r9=PM9/MM9;
r10=PM10/MM10;
r11=PM11/MM11;
r12=PM12/MM12;
r13=PM13/MM13;
r14=PM14/MM14;
r15=PM15/MM15;
PM=double([r1; r2; r3; r4; r5; r6; r7; r8; r9; r10; r11; r12; r13;
r14; r15]);
rtotal=double(r1+r2+r3+r4+r5+r6+r7+r8+r9+r10+r11+r12+r13+r14+r15);
xlswrite('TA.xlsx',PM,'Partisipasi Mode','A1');
%Mencari Modal Effective Mass
sigPF1=r1;
```

```
sigPF2=sigPF1+r2;
sigPF3=sigPF2+r3;
sigPF4=sigPF3+r4;
sigPF5=sigPF4+r5;
sigPF6=sigPF5+r6;
sigPF7=sigPF6+r7;
sigPF8=sigPF7+r8;
sigPF9=sigPF8+r9;
sigPF10=sigPF9+r10;
sigPF11=sigPF10+r11;
sigPF12=sigPF11+r12;
sigPF13=sigPF12+r13;
sigPF14=sigPF13+r14;
sigPF15=sigPF14+r15;
sigM=(m1+m2+m3+m4+m5+m6+m7+m8+m9+m10+m11+m12+m13+m14+m15);

emj1=(1/sigM)*(PM1^2/MM1);
emj2=(1/sigM)*(PM2^2/MM2);
emj3=(1/sigM)*(PM3^2/MM3);
emj4=(1/sigM)*(PM4^2/MM4);
emj5=(1/sigM)*(PM5^2/MM5);
emj6=(1/sigM)*(PM6^2/MM6);
emj7=(1/sigM)*(PM7^2/MM7);
emj8=(1/sigM)*(PM8^2/MM8);
emj9=(1/sigM)*(PM9^2/MM9);
emj10=(1/sigM)*(PM10^2/MM10);
emj11=(1/sigM)*(PM11^2/MM11);
emj12=(1/sigM)*(PM12^2/MM12);
emj13=(1/sigM)*(PM13^2/MM13);
emj14=(1/sigM)*(PM14^2/MM14);
emj15=(1/sigM)*(PM15^2/MM15);
Vemj=double([emj1; emj2; emj3; emj4; emj5; emj6; emj7; emj8; emj9;
emj10; emj11; emj12; emj13; emj14; emj15]);
xlswrite('TA.xlsx',Vemj,'EMJ','B2');

%Mencari nilai omega
omg1=sqrt(x1*u2/u1);
omg2=sqrt(x2*u2/u1);
omg3=sqrt(x3*u2/u1);
omg4=sqrt(x4*u2/u1);
omg5=sqrt(x5*u2/u1);
omg6=sqrt(x6*u2/u1);
omg7=sqrt(x7*u2/u1);
omg8=sqrt(x8*u2/u1);
omg9=sqrt(x9*u2/u1);
omg10=sqrt(x10*u2/u1);
omg11=sqrt(x11*u2/u1);
omg12=sqrt(x12*u2/u1);
omg13=sqrt(x13*u2/u1);
omg14=sqrt(x14*u2/u1);
omg15=sqrt(x15*u2/u1);
disp('Hasil Omega')
disp('-----------')
Vomg=double([omg1; omg2; omg3; omg4; omg5; omg6; omg7; omg8; omg9;
omg10; omg11; omg12; omg13; omg14; omg15]);
xlswrite('TA.xlsx',Vomg,'Omega','A1');
```

```
disp('Menghitung Periode')
disp('------------------')
P1=2*3.14/omg1;
P2=2*3.14/omg2;
P3=2*3.14/omg3;
P4=2*3.14/omg4;
P5=2*3.14/omg5;
P6=2*3.14/omg6;
P7=2*3.14/omg7;
P8=2*3.14/omg8;
P9=2*3.14/omg9;
P10=2*3.14/omg10;
P11=2*3.14/omg11;
P12=2*3.14/omg12;
P13=2*3.14/omg13;
P14=2*3.14/omg14;
P15=2*3.14/omg15;
VP=double([P1; P2; P3; P4; P5; P6; P7; P8; P9; P10; P11; P12; P13;
P14; P15])
xlswrite('TA.xlsx',VP,'Periode','B2');

disp('Menghitung Simpangan')
disp('--------------------')
dt=0.01;
%Mencari konstanta a
a1=omg1^2-(2/dt^2);
a2=omg2^2-(2/dt^2);
a3=omg3^2-(2/dt^2);
a4=omg4^2-(2/dt^2);
a5=omg5^2-(2/dt^2);
a6=omg6^2-(2/dt^2);
a7=omg7^2-(2/dt^2);
a8=omg8^2-(2/dt^2);
a9=omg9^2-(2/dt^2);
a10=omg10^2-(2/dt^2);
a11=omg11^2-(2/dt^2);
a12=omg12^2-(2/dt^2);
a13=omg13^2-(2/dt^2);
a14=omg14^2-(2/dt^2);
a15=omg15^2-(2/dt^2);
disp('Hasil a')
disp('-------')
Va=double([a1; a2; a3; a4; a5; a6; a7; a8; a9; a10; a11; a12; a13;
a14; a15]);
xlswrite('TA.xlsx',Va,'a','A1');

si=str2num(get(handles.edit3, 'string'));
%konstanta b
b1=(1/(dt^2))-(2*si*omg1)/(2*dt);
b2=(1/(dt^2))-(2*si*omg2)/(2*dt);
b3=(1/(dt^2))-(2*si*omg3)/(2*dt);
b4=(1/(dt^2))-(2*si*omg4)/(2*dt);
b5=(1/(dt^2))-(2*si*omg5)/(2*dt);
b6=(1/(dt^2))-(2*si*omg6)/(2*dt);
b7=(1/(dt^2))-(2*si*omg7)/(2*dt);
```

```
b8=(1/(dt^2))-(2*si*omg8)/(2*dt);
b9=(1/(dt^2))-(2*si*omg9)/(2*dt);
b10=(1/(dt^2))-(2*si*omg10)/(2*dt);
b11=(1/(dt^2))-(2*si*omg11)/(2*dt);
b12=(1/(dt^2))-(2*si*omg12)/(2*dt);
b13=(1/(dt^2))-(2*si*omg13)/(2*dt);
b14=(1/(dt^2))-(2*si*omg14)/(2*dt);
b15=(1/(dt^2))-(2*si*omg15)/(2*dt);
disp('Hasil b')
disp('-------')
Vb=double([b1; b2; b3; b4; b5; b6; b7; b8; b9; b10; b11; b12; b13;
b14; b15]);
xlswrite('TA.xlsx',Vb,'b','A1');
%konstanta k topi
kt1=(1/(dt^2))+(2*si*omg1)/(2*dt);
kt2=(1/(dt^2))+(2*si*omg2)/(2*dt);
kt3=(1/(dt^2))+(2*si*omg3)/(2*dt);
kt4=(1/(dt^2))+(2*si*omg4)/(2*dt);
kt5=(1/(dt^2))+(2*si*omg5)/(2*dt);
kt6=(1/(dt^2))+(2*si*omg6)/(2*dt);
kt7=(1/(dt^2))+(2*si*omg7)/(2*dt);
kt8=(1/(dt^2))+(2*si*omg8)/(2*dt);
kt9=(1/(dt^2))+(2*si*omg9)/(2*dt);
kt10=(1/(dt^2))+(2*si*omg10)/(2*dt);
kt11=(1/(dt^2))+(2*si*omg11)/(2*dt);
kt12=(1/(dt^2))+(2*si*omg12)/(2*dt);
kt13=(1/(dt^2))+(2*si*omg13)/(2*dt);
kt14=(1/(dt^2))+(2*si*omg14)/(2*dt);
kt15=(1/(dt^2))+(2*si*omg15)/(2*dt);
disp('Hasil k topi')
disp('------------')
Kt=double([kt1; kt2; kt3; kt4; kt5; kt6; kt7; kt8; kt9; kt10;
kt11; kt12; kt13; kt14; kt15]);
xlswrite('TA.xlsx',Kt,'Ktopi','A1');

%Menghitung Simpangan
AccG=getappdata(0,'Accel');
Sc=str2double(get(handles.edit4, 'string'));
Acc = AccG*Sc;
xlswrite('TA.xlsx',Acc,'Acc','B2');
%menghitung g1
g1=zeros(1,(length(Acc)));
for i=1:(length(Acc)-1);
    if i<2
        g1(i+1)=(-0-a1*0-b1*0)/kt1;
    else
        g1(i+1)=(-Acc(i)-a1*g1(i)-b1*g1(i-1))/kt1;
    end
end
%menghitung g2
g2=zeros(1,(length(Acc)));
for i=1:(length(Acc)-1);
    if i<2
        g2(i+1)=(-0-a2*0-b2*0)/kt2;
    else
        g2(i+1)=(-Acc(i)-a2*g2(i)-b2*g2(i-1))/kt2;
```

```
    end
end
%menghitung g3
g3=zeros(1,(length(Acc)));
for i=1:(length(Acc)-1);
    if i<2
        g3(i+1)=(-0-a3*0-b3*0)/kt3;
    else
        g3(i+1)=(-Acc(i)-a3*g3(i)-b3*g3(i-1))/kt3;
    end
end
%menghitung g4
g4=zeros(1,(length(Acc)));
for i=1:(length(Acc)-1);
    if i<2
        g4(i+1)=(-0-a4*0-b4*0)/kt4;
    else
        g4(i+1)=(-Acc(i)-a4*g4(i)-b4*g4(i-1))/kt4;
    end
end
%menghitung g5
g5=zeros(1,(length(Acc)));
for i=1:(length(Acc)-1);
    if i<2
        g5(i+1)=(-0-a5*0-b5*0)/kt5;
    else
        g5(i+1)=(-Acc(i)-a5*g5(i)-b5*g5(i-1))/kt5;
    end
end
%menghitung g6
g6=zeros(1,(length(Acc)));
for i=1:(length(Acc)-1);
    if i<2
        g6(i+1)=(-0-a6*0-b6*0)/kt6;
    else
        g6(i+1)=(-Acc(i)-a6*g6(i)-b6*g6(i-1))/kt6;
    end
end
%menghitung g7
g7=zeros(1,(length(Acc)));
for i=1:(length(Acc)-1);
    if i<2
        g7(i+1)=(-0-a7*0-b7*0)/kt7;
    else
        g7(i+1)=(-Acc(i)-a7*g7(i)-b7*g7(i-1))/kt7;
    end
end
%menghitung g8
g8=zeros(1,(length(Acc)));
for i=1:(length(Acc)-1);
    if i<2
        g8(i+1)=(-0-a8*0-b8*0)/kt8;
    else
        g8(i+1)=(-Acc(i)-a8*g8(i)-b8*g8(i-1))/kt8;
    end
end
```

```
%menghitung g9
g9=zeros(1,(length(Acc)));
for i=1:(length(Acc)-1);
    if i<2
        g9(i+1)=(-0-a9*0-b9*0)/kt9;
    else
        g9(i+1)=(-Acc(i)-a9*g9(i)-b9*g9(i-1))/kt9;
    end
end
%menghitung g10
g10=zeros(1,(length(Acc)));
for i=1:(length(Acc)-1);
    if i<2
        g10(i+1)=(-0-a10*0-b10*0)/kt10;
    else
        g10(i+1)=(-Acc(i)-a10*g10(i)-b10*g10(i-1))/kt10;
    end
end
%menghitung g11
g11=zeros(1,(length(Acc)));
for i=1:(length(Acc)-1);
    if i<2
        g11(i+1)=(-0-a11*0-b11*0)/kt11;
    else
        g11(i+1)=(-Acc(i)-a11*g11(i)-b11*g11(i-1))/kt11;
    end
end
%menghitung g12
g12=zeros(1,(length(Acc)));
for i=1:(length(Acc)-1);
    if i<2
        g12(i+1)=(-0-a12*0-b12*0)/kt12;
    else
        g12(i+1)=(-Acc(i)-a12*g12(i)-b12*g12(i-1))/kt12;
    end
end
%menghitung g13
g13=zeros(1,(length(Acc)));
for i=1:(length(Acc)-1);
    if i<2
        g13(i+1)=(-0-a13*0-b13*0)/kt13;
    else
        g13(i+1)=(-Acc(i)-a13*g13(i)-b13*g13(i-1))/kt13;
    end
end
%menghitung g14
g14=zeros(1,(length(Acc)));
for i=1:(length(Acc)-1);
    if i<2
        g14(i+1)=(-0-a14*0-b14*0)/kt14;
    else
        g14(i+1)=(-Acc(i)-a14*g14(i)-b14*g14(i-1))/kt14;
    end
end
%menghitung g15
g15=zeros(1,(length(Acc)));
```

```
for i=1:(length(Acc)-1);
    if i<2
        g15(i+1)=(-0-a15*0-b15*0)/kt15;
    else
        g15(i+1)=(-Acc(i)-a15*g15(i)-b15*g15(i-1))/kt15;
    end
end

%Menghitung G
G1=double(g1);
G2=double(g2);
G3=double(g3);
G4=double(g4);
G5=double(g5);
G6=double(g6);
G7=double(g7);
G8=double(g8);
G9=double(g9);
G10=double(g10);
G11=double(g11);
G12=double(g12);
G13=double(g13);
G14=double(g14);
G15=double(g15);
disp('Hasil G')
disp('-------')
NilaiG=[G1.' G2.' G3.' G4.' G5.' G6.' G7.' G8.' G9.' G10.' G11.'
G12.' G13.' G14.' G15.'];
%menyimpan data G
setappdata(0,'G',NilaiG);
xlswrite('TA.xlsx',NilaiG,'G','A1');

%Menghitung Z
Z1=double(g1'*r1);
Z2=double(g2'*r2);
Z3=double(g3'*r3);
Z4=double(g4'*r4);
Z5=double(g5'*r5);
Z6=double(g6'*r6);
Z7=double(g7'*r7);
Z8=double(g8'*r8);
Z9=double(g9'*r9);
Z10=double(g10'*r10);
Z11=double(g11'*r11);
Z12=double(g12'*r12);
Z13=double(g13'*r13);
Z14=double(g14'*r14);
Z15=double(g15'*r15);
disp('Hasil Z')
disp('-------')
NilaiZ=[Z1 Z2 Z3 Z4 Z5 Z6 Z7 Z8 Z9 Z10 Z11 Z12 Z13 Z14 Z15];
%menyimpan data Z
setappdata(0,'Z',NilaiZ);
xlswrite('TA.xlsx',NilaiZ,'Z','A1');

%Menghitung Y (Simpangan)
```

```
Y1=double(s1l1*Z1+s2l1*Z2+s3l1*Z3+s4l1*Z4+s5l1*Z5+s6l1*Z6+s7l1*Z7+
s8l1*Z8+s9l1*Z9+s10l1*Z10+s11l1*Z11+s12l1*Z12+s13l1*Z13+s14l1*Z14+
s15l1*Z15);
Y2=double(s1l2*Z1+s2l2*Z2+s3l2*Z3+s4l2*Z4+s5l2*Z5+s6l2*Z6+s7l2*Z7+
s8l2*Z8+s9l2*Z9+s10l2*Z10+s11l2*Z11+s12l2*Z12+s13l2*Z13+s14l2*Z14+
s15l2*Z15);
Y3=double(s1l3*Z1+s2l3*Z2+s3l3*Z3+s4l3*Z4+s5l3*Z5+s6l3*Z6+s7l3*Z7+
s8l3*Z8+s9l3*Z9+s10l3*Z10+s11l3*Z11+s12l3*Z12+s13l3*Z13+s14l3*Z14+
s15l3*Z15);
Y4=double(s1l4*Z1+s2l4*Z2+s3l4*Z3+s4l4*Z4+s5l4*Z5+s6l4*Z6+s7l4*Z7+
s8l4*Z8+s9l4*Z9+s10l4*Z10+s11l4*Z11+s12l4*Z12+s13l4*Z13+s14l4*Z14+
s15l4*Z15);
Y5=double(s1l5*Z1+s2l5*Z2+s3l5*Z3+s4l5*Z4+s5l5*Z5+s6l5*Z6+s7l5*Z7+
s8l5*Z8+s9l5*Z9+s10l5*Z10+s11l5*Z11+s12l5*Z12+s13l5*Z13+s14l5*Z14+
s15l5*Z15);
Y6=double(s1l6*Z1+s2l6*Z2+s3l6*Z3+s4l6*Z4+s5l6*Z5+s6l6*Z6+s7l6*Z7+
s8l6*Z8+s9l6*Z9+s10l6*Z10+s11l6*Z11+s12l6*Z12+s13l6*Z13+s14l6*Z14+
s15l6*Z15);
Y7=double(s1l7*Z1+s2l7*Z2+s3l7*Z3+s4l7*Z4+s5l7*Z5+s6l7*Z6+s7l7*Z7+
s8l7*Z8+s9l7*Z9+s10l7*Z10+s11l7*Z11+s12l7*Z12+s13l7*Z13+s14l7*Z14+
s15l7*Z15);
Y8=double(s1l8*Z1+s2l8*Z2+s3l8*Z3+s4l8*Z4+s5l8*Z5+s6l8*Z6+s7l8*Z7+
s8l8*Z8+s9l8*Z9+s10l8*Z10+s11l8*Z11+s12l8*Z12+s13l8*Z13+s14l8*Z14+
s15l8*Z15);
Y9=double(s1l9*Z1+s2l9*Z2+s3l9*Z3+s4l9*Z4+s5l9*Z5+s6l9*Z6+s7l9*Z7+
s8l9*Z8+s9l9*Z9+s10l9*Z10+s11l9*Z11+s12l9*Z12+s13l9*Z13+s14l9*Z14+
s15l9*Z15);
Y10=double(s1l10*Z1+s2l10*Z2+s3l10*Z3+s4l10*Z4+s5l10*Z5+s6l10*Z6+s
7l10*Z7+s8l10*Z8+s9l10*Z9+s10l10*Z10+s11l10*Z11+s12l10*Z12+s13l10*
Z13+s14l10*Z14+s15l10*Z15);
Y11=double(s1l11*Z1+s2l11*Z2+s3l11*Z3+s4l11*Z4+s5l11*Z5+s6l11*Z6+s
7l11*Z7+s8l11*Z8+s9l11*Z9+s10l11*Z10+s11l11*Z11+s12l11*Z12+s13l11*
Z13+s14l11*Z14+s15l11*Z15);
Y12=double(s1l12*Z1+s2l12*Z2+s3l12*Z3+s4l12*Z4+s5l12*Z5+s6l12*Z6+s
7l12*Z7+s8l12*Z8+s9l12*Z9+s10l12*Z10+s11l12*Z11+s12l12*Z12+s13l12*
Z13+s14l12*Z14+s15l12*Z15);
Y13=double(s1l13*Z1+s2l13*Z2+s3l13*Z3+s4l13*Z4+s5l13*Z5+s6l13*Z6+s
7l13*Z7+s8l13*Z8+s9l13*Z9+s10l13*Z10+s11l13*Z11+s12l13*Z12+s13l13*
Z13+s14l13*Z14+s15l13*Z15);
Y14=double(s1l14*Z1+s2l14*Z2+s3l14*Z3+s4l14*Z4+s5l14*Z5+s6l14*Z6+s
7l14*Z7+s8l14*Z8+s9l14*Z9+s10l14*Z10+s11l14*Z11+s12l14*Z12+s13l14*
Z13+s14l14*Z14+s15l14*Z15);
Y15=double(s1l15*Z1+s2l15*Z2+s3l15*Z3+s4l15*Z4+s5l15*Z5+s6l15*Z6+s
7l15*Z7+s8l15*Z8+s9l15*Z9+s10l15*Z10+s11l15*Z11+s12l15*Z12+s13l15*
Z13+s14l15*Z14+s15l15*Z15);
disp('Hasil Y')
disp('-------')
NilaiY=[Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8 Y9 Y10 Y11 Y12 Y13 Y14 Y15];
%menyimpan data G
setappdata(0,'Y',NilaiY);
xlswrite('TA.xlsx',NilaiY,'Y','A1');

%Menghitung Interstory Drift
H=350;
DR1=((Y1-0)/H)*100;
DR2=((Y2-Y1)/H)*100;
```

```
DR3=((Y3-Y2)/H)*100;
DR4=((Y4-Y3)/H)*100;
DR5=((Y5-Y4)/H)*100;
DR6=((Y6-Y5)/H)*100;
DR7=((Y7-Y6)/H)*100;
DR8=((Y8-Y7)/H)*100;
DR9=((Y9-Y8)/H)*100;
DR10=((Y10-Y9)/H)*100;
DR11=((Y11-Y10)/H)*100;
DR12=((Y12-Y11)/H)*100;
DR13=((Y13-Y12)/H)*100;
DR14=((Y14-Y13)/H)*100;
DR15=((Y15-Y14)/H)*100;
disp('Hasil Interstory Drift')
disp('----------------------')
NilaiDR=[DR1 DR2 DR3 DR4 DR5 DR6 DR7 DR8 DR9 DR10 DR11 DR12 DR13
DR14 DR15];
%menyimpan data G
setappdata(0,'DR',NilaiDR);
xlswrite('TA.xlsx',NilaiDR,'Interstory Drift','A1');
%menghitung gaya horisontal tingkat(F)
matk=double([(k1+k2) -k2 0 0 0 0 0 0 0 0 0 0 0 0 0
    -k2 (k2+k3) -k3 0 0 0 0 0 0 0 0 0 0 0
    0 -k3 (k3+k4) -k4 0 0 0 0 0 0 0 0 0 0
    0 0 -k4 (k4+k5) -k5 0 0 0 0 0 0 0 0 0
    0 0 0 -k5 (k5+k6) -k6 0 0 0 0 0 0 0 0
    0 0 0 0 -k6 (k6+k7) -k7 0 0 0 0 0 0 0
    0 0 0 0 0 -k7 (k7+k8) -k8 0 0 0 0 0 0
    0 0 0 0 0 0 -k8 (k8+k9) -k9 0 0 0 0 0
    0 0 0 0 0 0 0 -k9 (k9+k10) -k10 0 0 0 0
    0 0 0 0 0 0 0 0 -k10 (k10+k11) -k11 0 0 0
    0 0 0 0 0 0 0 0 0 -k11 (k11+k12) -k12 0 0
    0 0 0 0 0 0 0 0 0 0 -k12 (k12+k13) -k13 0
    0 0 0 0 0 0 0 0 0 0 0 -k13 (k13+k14) -k14
    0 0 0 0 0 0 0 0 0 0 0 0 -k14 (k14+k15) -k15
    0 0 0 0 0 0 0 0 0 0 0 0 0 -k15 k15]);
F1=Y1*matk(1)+Y2*matk(16)+Y3*matk(31)+Y4*matk(46)+Y5*matk(61)+Y6*m
atk(76)+Y7*matk(91)+Y8*matk(106)+Y9*matk(121)+Y10*matk(136)+Y11*ma
tk(151)+Y12*matk(166)+Y13*matk(181)+Y14*matk(196)+Y15*matk(211);
F2=Y1*matk(2)+Y2*matk(17)+Y3*matk(32)+Y4*matk(47)+Y5*matk(62)+Y6*m
atk(77)+Y7*matk(92)+Y8*matk(107)+Y9*matk(122)+Y10*matk(137)+Y11*ma
tk(152)+Y12*matk(167)+Y13*matk(182)+Y14*matk(197)+Y15*matk(212);
F3=Y1*matk(3)+Y2*matk(18)+Y3*matk(33)+Y4*matk(48)+Y5*matk(63)+Y6*m
atk(78)+Y7*matk(93)+Y8*matk(108)+Y9*matk(123)+Y10*matk(138)+Y11*ma
tk(153)+Y12*matk(168)+Y13*matk(183)+Y14*matk(198)+Y15*matk(213);
F4=Y1*matk(4)+Y2*matk(19)+Y3*matk(34)+Y4*matk(49)+Y5*matk(64)+Y6*m
atk(79)+Y7*matk(94)+Y8*matk(109)+Y9*matk(124)+Y10*matk(139)+Y11*ma
tk(154)+Y12*matk(169)+Y13*matk(184)+Y14*matk(199)+Y15*matk(214);
F5=Y1*matk(5)+Y2*matk(20)+Y3*matk(35)+Y4*matk(50)+Y5*matk(65)+Y6*m
atk(80)+Y7*matk(95)+Y8*matk(110)+Y9*matk(125)+Y10*matk(140)+Y11*ma
tk(155)+Y12*matk(170)+Y13*matk(185)+Y14*matk(200)+Y15*matk(215);
F6=Y1*matk(6)+Y2*matk(21)+Y3*matk(36)+Y4*matk(51)+Y5*matk(66)+Y6*m
atk(81)+Y7*matk(96)+Y8*matk(111)+Y9*matk(126)+Y10*matk(141)+Y11*ma
tk(156)+Y12*matk(171)+Y13*matk(186)+Y14*matk(201)+Y15*matk(216);
```

```
F7=Y1*matk(7)+Y2*matk(22)+Y3*matk(37)+Y4*matk(52)+Y5*matk(67)+Y6*m
atk(82)+Y7*matk(97)+Y8*matk(112)+Y9*matk(127)+Y10*matk(142)+Y11*ma
tk(157)+Y12*matk(172)+Y13*matk(187)+Y14*matk(202)+Y15*matk(217);
F8=Y1*matk(8)+Y2*matk(23)+Y3*matk(38)+Y4*matk(53)+Y5*matk(68)+Y6*m
atk(83)+Y7*matk(98)+Y8*matk(113)+Y9*matk(128)+Y10*matk(143)+Y11*ma
tk(158)+Y12*matk(173)+Y13*matk(188)+Y14*matk(203)+Y15*matk(218);
F9=Y1*matk(9)+Y2*matk(24)+Y3*matk(39)+Y4*matk(54)+Y5*matk(69)+Y6*m
atk(84)+Y7*matk(99)+Y8*matk(114)+Y9*matk(129)+Y10*matk(144)+Y11*ma
tk(159)+Y12*matk(174)+Y13*matk(189)+Y14*matk(204)+Y15*matk(219);
F10=Y1*matk(10)+Y2*matk(25)+Y3*matk(40)+Y4*matk(55)+Y5*matk(70)+Y6
*matk(85)+Y7*matk(100)+Y8*matk(115)+Y9*matk(130)+Y10*matk(145)+Y11
*matk(160)+Y12*matk(175)+Y13*matk(190)+Y14*matk(205)+Y15*matk(220)
;
F11=Y1*matk(11)+Y2*matk(26)+Y3*matk(41)+Y4*matk(56)+Y5*matk(71)+Y6
*matk(86)+Y7*matk(101)+Y8*matk(116)+Y9*matk(131)+Y10*matk(146)+Y11
*matk(161)+Y12*matk(176)+Y13*matk(191)+Y14*matk(206)+Y15*matk(221)
;
F12=Y1*matk(12)+Y2*matk(27)+Y3*matk(42)+Y4*matk(57)+Y5*matk(72)+Y6
*matk(87)+Y7*matk(102)+Y8*matk(117)+Y9*matk(132)+Y10*matk(147)+Y11
*matk(162)+Y12*matk(177)+Y13*matk(192)+Y14*matk(207)+Y15*matk(222)
;
F13=Y1*matk(13)+Y2*matk(28)+Y3*matk(43)+Y4*matk(58)+Y5*matk(73)+Y6
*matk(88)+Y7*matk(103)+Y8*matk(118)+Y9*matk(133)+Y10*matk(148)+Y11
*matk(163)+Y12*matk(178)+Y13*matk(193)+Y14*matk(208)+Y15*matk(223)
;
F14=Y1*matk(14)+Y2*matk(29)+Y3*matk(44)+Y4*matk(59)+Y5*matk(74)+Y6
*matk(89)+Y7*matk(104)+Y8*matk(119)+Y9*matk(134)+Y10*matk(149)+Y11
*matk(164)+Y12*matk(179)+Y13*matk(194)+Y14*matk(209)+Y15*matk(224)
;
F15=Y1*matk(15)+Y2*matk(30)+Y3*matk(45)+Y4*matk(60)+Y5*matk(75)+Y6
*matk(90)+Y7*matk(105)+Y8*matk(120)+Y9*matk(135)+Y10*matk(150)+Y11
*matk(165)+Y12*matk(180)+Y13*matk(195)+Y14*matk(210)+Y15*matk(225)
;
disp('Hasil F')
disp('-------')
NilaiF=[F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 F13 F14 F15];
%menyimpan data G
setappdata(0,'F',NilaiF);
xlswrite('TA.xlsx',NilaiF,'F','A1');
%menghitung gaya geser tingkat(V)
V1=F1+F2+F3+F4+F5+F6+F7+F8+F9+F10+F11+F12+F13+F14+F15;
V2=F2+F3+F4+F5+F6+F7+F8+F9+F10+F11+F12+F13+F14+F15;
V3=F3+F4+F5+F6+F7+F8+F9+F10+F11+F12+F13+F14+F15;
V4=F4+F5+F6+F7+F8+F9+F10+F11+F12+F13+F14+F15;
V5=F5+F6+F7+F8+F9+F10+F11+F12+F13+F14+F15;
V6=F6+F7+F8+F9+F10+F11+F12+F13+F14+F15;
V7=F7+F8+F9+F10+F11+F12+F13+F14+F15;
V8=F8+F9+F10+F11+F12+F13+F14+F15;
V9=F9+F10+F11+F12+F13+F14+F15;
V10=F10+F11+F12+F13+F14+F15;
V11=F11+F12+F13+F14+F15;
V12=F12+F13+F14+F15;
V13=F13+F14+F15;
V14=F14+F15;
V15=F15;
disp('Hasil V')
```

```
disp('-------')
NilaiV=[V1 V2 V3 V4 V5 V6 V7 V8 V9 V10 V11 V12 V13 V14 V15];
%menyimpan data G
setappdata(0,'V',NilaiV);
xlswrite('TA.xlsx',NilaiV,'V','A1');
%menghitung Momen Guling(M)
h1=3.5; h2=h1+3.5; h3=h2+3.5; h4=h3+3.5; h5=h4+3.5; h6=h5+3.5;
h7=h6+3.5; h8=h7+3.5; h9=h8+3.5; h10=h9+3.5;
h11=h10+3.5; h12=h11+3.5; h13=h12+3.5; h14=h13+3.5; h15=h14+3.5;
MG1=F1*h1+F2*h2+F3*h3+F4*h4+F5*h5+F6*h6+F7*h7+F8*h8+F9*h9+F10*h10+
F11*h11+F12*h12+F13*h13+F14*h14+F15*h15;
MG2=F2*h2+F3*h3+F4*h4+F5*h5+F6*h6+F7*h7+F8*h8+F9*h9+F10*h10+F11*h1
1+F12*h12+F13*h13+F14*h14+F15*h15;
MG3=F3*h3+F4*h4+F5*h5+F6*h6+F7*h7+F8*h8+F9*h9+F10*h10+F11*h11+F12*
h12+F13*h13+F14*h14+F15*h15;
MG4=F4*h4+F5*h5+F6*h6+F7*h7+F8*h8+F9*h9+F10*h10+F11*h11+F12*h12+F1
3*h13+F14*h14+F15*h15;
MG5=F5*h5+F6*h6+F7*h7+F8*h8+F9*h9+F10*h10+F11*h11+F12*h12+F13*h13+
F14*h14+F15*h15;
MG6=F6*h6+F7*h7+F8*h8+F9*h9+F10*h10+F11*h11+F12*h12+F13*h13+F14*h1
4+F15*h15;
MG7=F7*h7+F8*h8+F9*h9+F10*h10+F11*h11+F12*h12+F13*h13+F14*h14+F15*
h15;
MG8=F8*h8+F9*h9+F10*h10+F11*h11+F12*h12+F13*h13+F14*h14+F15*h15;
MG9=F9*h9+F10*h10+F11*h11+F12*h12+F13*h13+F14*h14+F15*h15;
MG10=F10*h10+F11*h11+F12*h12+F13*h13+F14*h14+F15*h15;
MG11=F11*h11+F12*h12+F13*h13+F14*h14+F15*h15;
MG12=F12*h12+F13*h13+F14*h14+F15*h15;
MG13=F13*h13+F14*h14+F15*h15;
MG14=F14*h14+F15*h15;
MG15=F15*h15;
disp('Hasil MG')
disp('-------')
NilaiMG=[MG1 MG2 MG3 MG4 MG5 MG6 MG7 MG8 MG9 MG10 MG11 MG12 MG13
MG14 MG15];
%menyimpan data G
setappdata(0,'MG',NilaiMG);
xlswrite('TA.xlsx',NilaiMG,'Momen Guling','A1');

close (h)
h=msgbox('Hasil Dapat Dilihat Pada Ms. Excel');

function edit3_Callback(hObject, eventdata, handles)
% hObject    handle to edit3 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit3 as text
%        str2double(get(hObject,'String')) returns contents of
edit3 as a double


% --- Executes during object creation, after setting all
properties.
```

```
function edit3_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit3 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    empty - handles not created until after all
CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end



function edit4_Callback(hObject, eventdata, handles)
% hObject    handle to edit4 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: get(hObject,'String') returns contents of edit4 as text
%        str2double(get(hObject,'String')) returns contents of
edit4 as a double


% --- Executes during object creation, after setting all
properties.
function edit4_CreateFcn(hObject, eventdata, handles)
% hObject    handle to edit4 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    empty - handles not created until after all
CreateFcns called

% Hint: edit controls usually have a white background on Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end



% --- Executes on button press in pushbutton5.
function pushbutton5_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton5 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
MS

% --- Executes on button press in pushbutton6.
function pushbutton6_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton6 (see GCBO)
```

```
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
[aaa,bbb]=uigetfile('Data Gempa\.txt','Pilih Data Gempa');
Gempa=fullfile(bbb,aaa);
fid=fopen(Gempa,'r');
formatData='%f %f';
sizeData = [2 inf];
A = fscanf(fid,formatData,sizeData)';
fclose(fid);
T0 = A(:,1);
Acc0 = A(:,2);
setappdata(0,'Periode',T0);
setappdata(0,'Accel',Acc0);

h=msgbox('Gempa Berhasil Dipilih');


% --- Executes on selection change in popupmenu6.
function popupmenu6_Callback(hObject, eventdata, handles)
% hObject    handle to popupmenu6 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)

% Hints: contents = cellstr(get(hObject,'String')) returns
popupmenu6 contents as cell array
%        contents{get(hObject,'Value')} returns selected item from
popupmenu6


% --- Executes during object creation, after setting all
properties.
function popupmenu6_CreateFcn(hObject, eventdata, handles)
% hObject    handle to popupmenu6 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    empty - handles not created until after all
CreateFcns called

% Hint: popupmenu controls usually have a white background on
Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end


% --- Executes on selection change in popupmenu7.
function popupmenu7_Callback(hObject, eventdata, handles)
% hObject    handle to popupmenu7 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
```

```
% Hints: contents = cellstr(get(hObject,'String')) returns
popupmenu7 contents as cell array
%        contents{get(hObject,'Value')} returns selected item from
popupmenu7


% --- Executes during object creation, after setting all
properties.
function popupmenu7_CreateFcn(hObject, eventdata, handles)
% hObject    handle to popupmenu7 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    empty - handles not created until after all
CreateFcns called

% Hint: popupmenu controls usually have a white background on
Windows.
%       See ISPC and COMPUTER.
if ispc && isequal(get(hObject,'BackgroundColor'),
get(0,'defaultUicontrolBackgroundColor'))
    set(hObject,'BackgroundColor','white');
end


% --- Executes during object deletion, before destroying
properties.
function popupmenu3_DeleteFcn(hObject, eventdata, handles)
% hObject    handle to popupmenu3 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)


% --- Executes on button press in pushbutton7.
function pushbutton7_Callback(hObject, eventdata, handles)
% hObject    handle to pushbutton7 (see GCBO)
% eventdata  reserved - to be defined in a future version of
MATLAB
% handles    structure with handles and user data (see GUIDATA)
[aaa,bbb]=uigetfile('Masa Kekakuan\.txt','Pilih Masa Kekakuan');
MK=fullfile(bbb,aaa);
fid=fopen(MK,'r');
formatData='%f %f';
sizeData = [2 inf];
A = fscanf(fid,formatData,sizeData)';
fclose(fid);
Mass = A(:,1);
Stiff = A(:,2);
setappdata(0,'Massa',Mass);
setappdata(0,'Stiffness',Stiff);

h=msgbox('Masa dan Kekakuan Berhasil Dipilih');
```