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LAMPIRAN



Optimization Software:
www.balesio.com

Lampiran 1. Data Kecepatan angin dari tahun 1985-2015

Waktu	U (m/s)	Waktu	U (m/s)	Waktu	U (m/s)	Waktu	U (m/s)	Waktu	U (m/s)
1/1/1985	13.23	1/1/1990	16.63	1/1/1995	5.59	1/1/2000	10.81	1/1/2005	8.43
1/2/1985	14.31	1/2/1990	4.93	1/2/1995	17.78	1/2/2000	15.12	1/2/2005	1.19
1/3/1985	14.27	1/3/1990	1.51	1/3/1995	20.26	1/3/2000	10.98	1/3/2005	5.14
1/4/1985	7.42	1/4/1990	8.88	1/4/1995	8.96	1/4/2000	16.12	1/4/2005	4.41
1/5/1985	13.21	1/5/1990	4.95	1/5/1995	4.45	1/5/2000	20.18	1/5/2005	2.88
1/6/1985	11.82	1/6/1990	6.73	1/6/1995	10.34	1/6/2000	3.67	1/6/2005	14.14
1/7/1985	18.53	1/7/1990	21.72	1/7/1995	8.93	1/7/2000	8.36	1/7/2005	8.31
1/8/1985	12.18	1/8/1990	12.64	1/8/1995	9.11	1/8/2000	7.90	1/8/2005	13.12
1/9/1985	8.84	1/9/1990	7.04	1/9/1995	6.63	1/9/2000	12.74	1/9/2005	10.26
1/10/1985	10.01	1/10/1990	12.38	1/10/1995	2.97	1/10/2000	6.11	1/10/2005	12.10
1/11/1985	21.78	1/11/1990	1.19	1/11/1995	3.77	1/11/2000	10.89	1/11/2005	1.23
1/12/1985	14.82	1/12/1990	4.83	1/12/1995	4.71	1/12/2000	14.83	1/12/2005	0.81
1/13/1985	21.26	1/13/1990	7.78	1/13/1995	25.57	1/13/2000	13.28	1/13/2005	9.62
1/14/1985	15.25	1/14/1990	6.47	1/14/1995	11.67	1/14/2000	8.66	1/14/2005	4.02
1/15/1985	20.30	1/15/1990	8.55	1/15/1995	12.75	1/15/2000	11.12	1/15/2005	11.66
1/16/1985	14.96	1/16/1990	18.57	1/16/1995	7.48	1/16/2000	7.13	1/16/2005	8.97
1/17/1985	22.22	1/17/1990	13.64	1/17/1995	9.54	1/17/2000	2.27	1/17/2005	9.11
1/18/1985	17.75	1/18/1990	2.08	1/18/1995	15.02	1/18/2000	15.38	1/18/2005	11.50
1/19/1985	15.12	1/19/1990	12.26	1/19/1995	10.56	1/19/2000	20.40	1/19/2005	3.72
1/20/1985	7.18	1/20/1990	11.68	1/20/1995	6.62	1/20/2000	29.07	1/20/2005	17.24
1/21/1985	27.21	1/21/1990	6.11	1/21/1995	16.12	1/21/2000	15.22	1/21/2005	25.43
1/22/1985	21.50	1/22/1990	4.05	1/22/1995	8.73	1/22/2000	20.30	1/22/2005	8.76
1/23/1985	17.72	1/23/1990	2.51	1/23/1995	8.71	1/23/2000	20.29	1/23/2005	8.31
1/24/1985	20.01	1/24/1990	6.91	1/24/1995	9.88	1/24/2000	10.82	1/24/2005	2.16
1/25/1985	10.48	1/25/1990	12.38	1/25/1995	9.95	1/25/2000	6.72	1/25/2005	6.61
1/26/1985	16.69	1/26/1990	13.23	1/26/1995	3.42	1/26/2000	9.48	1/26/2005	2.94
1/27/1985	22.87	1/27/1990	17.67	1/27/1995	11.12	1/27/2000	6.85	1/27/2005	2.54
1/28/1985	25.83	1/28/1990	14.98	1/28/1995	10.00	1/28/2000	7.33	1/28/2005	4.33
1/29/1985	29.71	1/29/1990	14.55	1/29/1995	12.86	1/29/2000	9.14	1/29/2005	8.90
1/30/1985	26.55	1/30/1990	19.38	1/30/1995	10.97	1/30/2000	11.56	1/30/2005	3.57
1/31/1985	10.48	1/31/1990	13.83	1/31/1995	8.52	1/31/2000	20.05	1/31/2005	14.15
2/1/1985	23.37	2/1/1990	19.63	2/1/1995	16.42	2/1/2000	4.71	2/1/2005	22.43
2/2/1985	22.90	2/2/1990	9.63	2/2/1995	13.00	2/2/2000	9.80	2/2/2005	9.23
2/3/1985	20.54	2/3/1990	5.41	2/3/1995	16.37	2/3/2000	14.42	2/3/2005	23.59
	15.74	2/4/1990	4.52	2/4/1995	4.43	2/4/2000	16.38	2/4/2005	15.41
	17.89	2/5/1990	11.78	2/5/1995	5.75	2/5/2000	21.59	2/5/2005	15.10
	19.74	2/6/1990	13.47	2/6/1995	8.79	2/6/2000	14.34	2/6/2005	10.69
	23.07	2/7/1990	22.22	2/7/1995	21.54	2/7/2000	12.44	2/7/2005	11.55



Waktu	U (m/s)	Waktu	U (m/s)	Waktu	U (m/s)	Waktu	U (m/s)	Waktu	U (m/s)
2/8/1985	16.08	2/8/1990	29.87	2/8/1995	5.17	2/8/2000	12.51	2/8/2005	15.08
2/9/1985	13.70	2/9/1990	16.02	2/9/1995	6.39	2/9/2000	10.38	2/9/2005	5.94
2/10/1985	20.52	2/10/1990	25.61	2/10/1995	12.11	2/10/2000	4.38	2/10/2005	12.29
2/11/1985	15.20	2/11/1990	18.40	2/11/1995	5.03	2/11/2000	4.57	2/11/2005	23.35
2/12/1985	11.54	2/12/1990	24.51	2/12/1995	5.93	2/12/2000	4.06	2/12/2005	29.40
2/13/1985	13.11	2/13/1990	25.85	2/13/1995	9.26	2/13/2000	0.87	2/13/2005	36.08
2/14/1985	17.94	2/14/1990	27.03	2/14/1995	9.94	2/14/2000	9.43	2/14/2005	23.94
2/15/1985	14.96	2/15/1990	22.49	2/15/1995	6.91	2/15/2000	5.28	2/15/2005	22.06
2/16/1985	6.59	2/16/1990	12.45	2/16/1995	4.42	2/16/2000	1.03	2/16/2005	18.30
2/17/1985	6.45	2/17/1990	2.14	2/17/1995	7.40	2/17/2000	10.69	2/17/2005	24.61
2/18/1985	17.17	2/18/1990	23.21	2/18/1995	4.30	2/18/2000	7.03	2/18/2005	20.83
2/19/1985	17.06	2/19/1990	16.16	2/19/1995	15.60	2/19/2000	8.19	2/19/2005	23.71
2/20/1985	20.82	2/20/1990	17.60	2/20/1995	2.29	2/20/2000	10.81	2/20/2005	22.24
2/21/1985	8.66	2/21/1990	17.34	2/21/1995	6.47	2/21/2000	7.20	2/21/2005	8.98
2/22/1985	17.47	2/22/1990	9.43	2/22/1995	19.72	2/22/2000	4.23	2/22/2005	18.08
2/23/1985	18.49	2/23/1990	7.45	2/23/1995	9.06	2/23/2000	10.66	2/23/2005	21.01
2/24/1985	24.94	2/24/1990	16.78	2/24/1995	15.43	2/24/2000	6.94	2/24/2005	14.40
2/25/1985	17.74	2/25/1990	8.66	2/25/1995	13.15	2/25/2000	10.53	2/25/2005	15.87
2/26/1985	10.23	2/26/1990	2.91	2/26/1995	8.73	2/26/2000	6.96	2/26/2005	30.35
2/27/1985	3.91	2/27/1990	13.60	2/27/1995	3.34	2/27/2000	13.62	2/27/2005	25.75
2/28/1985	7.87	2/28/1990	19.06	2/28/1995	10.14	2/28/2000	6.12	2/28/2005	31.47
3/1/1985	3.28	3/1/1990	13.38	3/1/1995	6.37	2/29/2000	9.70	3/1/2005	6.37
3/2/1985	6.55	3/2/1990	23.22	3/2/1995	13.25	3/1/2000	29.92	3/2/2005	4.69
3/3/1985	4.23	3/3/1990	22.01	3/3/1995	9.07	3/2/2000	22.45	3/3/2005	9.83
3/4/1985	1.93	3/4/1990	15.30	3/4/1995	9.60	3/3/2000	19.54	3/4/2005	16.52
3/5/1985	9.89	3/5/1990	11.45	3/5/1995	4.88	3/4/2000	14.58	3/5/2005	23.16
3/6/1985	8.60	3/6/1990	9.31	3/6/1995	6.83	3/5/2000	14.63	3/6/2005	12.31
3/7/1985	2.59	3/7/1990	22.29	3/7/1995	8.15	3/6/2000	14.63	3/7/2005	21.36
3/8/1985	27.34	3/8/1990	19.40	3/8/1995	9.14	3/7/2000	9.63	3/8/2005	9.12
3/9/1985	30.42	3/9/1990	22.50	3/9/1995	15.06	3/8/2000	13.66	3/9/2005	12.41
3/10/1985	17.69	3/10/1990	13.69	3/10/1995	20.55	3/9/2000	9.76	3/10/2005	29.19
3/11/1985	15.89	3/11/1990	2.29	3/11/1995	17.49	3/10/2000	13.09	3/11/2005	16.25
3/12/1985	21.57	3/12/1990	5.13	3/12/1995	24.33	3/11/2000	10.68	3/12/2005	7.44
3/13/1985	9.06	3/13/1990	5.46	3/13/1995	8.63	3/12/2000	15.64	3/13/2005	6.44
3/14/1985	17.12	3/14/1990	15.39	3/14/1995	24.21	3/13/2000	24.06	3/14/2005	16.32
3/15/1985	16.50	3/15/1990	23.91	3/15/1995	8.70	3/14/2000	17.33	3/15/2005	15.32
	20.33	3/16/1990	18.73	3/16/1995	10.22	3/15/2000	21.01	3/16/2005	7.65
	20.00	3/17/1990	18.10	3/17/1995	18.98	3/16/2000	31.83	3/17/2005	17.09
	14.39	3/18/1990	27.10	3/18/1995	29.06	3/17/2000	21.17	3/18/2005	1.63
	15.21	3/19/1990	23.07	3/19/1995	14.52	3/18/2000	6.12	3/19/2005	6.05



Waktu	U (m/s)	Waktu	U (m/s)	Waktu	U (m/s)	Waktu	U (m/s)	Waktu	U (m/s)
3/20/1985	12.30	3/20/1990	23.60	3/20/1995	12.14	3/19/2000	5.17	3/20/2005	5.12
3/21/1985	5.81	3/21/1990	19.12	3/21/1995	10.27	3/20/2000	7.73	3/21/2005	4.61
3/22/1985	5.84	3/22/1990	18.10	3/22/1995	18.70	3/21/2000	13.66	3/22/2005	8.03
3/23/1985	9.46	3/23/1990	15.81	3/23/1995	22.84	3/22/2000	14.24	3/23/2005	1.36
3/24/1985	22.08	3/24/1990	15.93	3/24/1995	22.73	3/23/2000	5.98	3/24/2005	7.14
3/25/1985	16.64	3/25/1990	15.25	3/25/1995	34.20	3/24/2000	17.39	3/25/2005	1.13
3/26/1985	9.18	3/26/1990	20.26	3/26/1995	28.96	3/25/2000	10.05	3/26/2005	14.56
3/27/1985	18.91	3/27/1990	26.15	3/27/1995	19.09	3/26/2000	7.79	3/27/2005	14.76
3/28/1985	16.09	3/28/1990	32.82	3/28/1995	24.73	3/27/2000	5.19	3/28/2005	9.54
3/29/1985	18.96	3/29/1990	32.93	3/29/1995	15.75	3/28/2000	5.28	3/29/2005	13.57
3/30/1985	9.98	3/30/1990	32.17	3/30/1995	6.95	3/29/2000	6.15	3/30/2005	17.60
3/31/1985	6.37	3/31/1990	36.01	3/31/1995	12.35	3/30/2000	12.58	3/31/2005	13.66
4/1/1985	17.78	4/1/1990	14.91	4/1/1995	9.55	3/31/2000	7.69	4/1/2005	21.65
4/2/1985	15.41	4/2/1990	24.07	4/2/1995	7.10	4/1/2000	7.06	4/2/2005	11.30
4/3/1985	11.97	4/3/1990	9.18	4/3/1995	3.88	4/2/2000	14.58	4/3/2005	12.37
4/4/1985	8.98	4/4/1990	14.69	4/4/1995	9.55	4/3/2000	15.86	4/4/2005	11.91
4/5/1985	19.49	4/5/1990	21.18	4/5/1995	15.81	4/4/2000	9.34	4/5/2005	14.62
4/6/1985	4.60	4/6/1990	21.51	4/6/1995	16.45	4/5/2000	13.06	4/6/2005	12.34
4/7/1985	20.43	4/7/1990	18.90	4/7/1995	20.20	4/6/2000	16.52	4/7/2005	22.60
4/8/1985	17.89	4/8/1990	8.89	4/8/1995	12.38	4/7/2000	23.45	4/8/2005	13.19
4/9/1985	5.56	4/9/1990	17.20	4/9/1995	13.07	4/8/2000	20.05	4/9/2005	24.51
4/10/1985	14.22	4/10/1990	25.15	4/10/1995	6.77	4/9/2000	16.11	4/10/2005	14.60
4/11/1985	11.73	4/11/1990	20.30	4/11/1995	9.52	4/10/2000	6.73	4/11/2005	13.57
4/12/1985	16.36	4/12/1990	23.08	4/12/1995	3.01	4/11/2000	11.91	4/12/2005	10.96
4/13/1985	18.30	4/13/1990	23.04	4/13/1995	13.53	4/12/2000	8.77	4/13/2005	10.49
4/14/1985	17.21	4/14/1990	20.21	4/14/1995	12.94	4/13/2000	26.35	4/14/2005	7.51
4/15/1985	15.28	4/15/1990	10.74	4/15/1995	10.25	4/14/2000	5.46	4/15/2005	5.15
4/16/1985	15.70	4/16/1990	19.43	4/16/1995	18.13	4/15/2000	20.25	4/16/2005	10.03
4/17/1985	20.25	4/17/1990	20.73	4/17/1995	12.59	4/16/2000	31.70	4/17/2005	13.63
4/18/1985	12.10	4/18/1990	7.57	4/18/1995	19.10	4/17/2000	11.35	4/18/2005	19.36
4/19/1985	3.29	4/19/1990	12.25	4/19/1995	27.93	4/18/2000	15.76	4/19/2005	24.05
4/20/1985	8.23	4/20/1990	13.00	4/20/1995	25.74	4/19/2000	15.03	4/20/2005	27.23
4/21/1985	6.12	4/21/1990	16.56	4/21/1995	27.64	4/20/2000	11.40	4/21/2005	27.59
4/22/1985	11.80	4/22/1990	11.23	4/22/1995	19.21	4/21/2000	15.53	4/22/2005	27.93
4/23/1985	20.29	4/23/1990	12.09	4/23/1995	22.19	4/22/2000	9.02	4/23/2005	24.40
4/24/1985	13.91	4/24/1990	10.21	4/24/1995	15.90	4/23/2000	1.53	4/24/2005	23.35
	10.04	4/25/1990	16.22	4/25/1995	19.54	4/24/2000	12.17	4/25/2005	23.42
	13.86	4/26/1990	17.84	4/26/1995	13.07	4/25/2000	19.71	4/26/2005	23.60
	13.22	4/27/1990	26.63	4/27/1995	21.59	4/26/2000	3.72	4/27/2005	22.57
	22.70	4/28/1990	24.56	4/28/1995	24.38	4/27/2000	10.25	4/28/2005	22.84



Waktu	U (m/s)	Waktu	U (m/s)	Waktu	U (m/s)	Waktu	U (m/s)	Waktu	U (m/s)
4/29/1985	26.32	4/29/1990	33.38	4/29/1995	21.52	4/28/2000	15.10	4/29/2005	21.45
4/30/1985	22.65	4/30/1990	33.18	4/30/1995	19.25	4/29/2000	19.23	4/30/2005	22.23
5/1/1985	5.22	5/1/1990	16.69	5/1/1995	21.96	4/30/2000	10.07	5/1/2005	20.26
5/2/1985	5.19	5/2/1990	14.87	5/2/1995	22.53	5/1/2000	11.39	5/2/2005	15.83
5/3/1985	1.55	5/3/1990	12.11	5/3/1995	24.02	5/2/2000	26.23	5/3/2005	22.35
5/4/1985	5.13	5/4/1990	10.93	5/4/1995	18.89	5/3/2000	22.60	5/4/2005	22.27
5/5/1985	3.53	5/5/1990	12.60	5/5/1995	17.09	5/4/2000	17.84	5/5/2005	18.15
5/6/1985	3.14	5/6/1990	9.80	5/6/1995	19.76	5/5/2000	24.47	5/6/2005	10.43
5/7/1985	2.25	5/7/1990	6.15	5/7/1995	25.43	5/6/2000	19.24	5/7/2005	18.20
5/8/1985	1.08	5/8/1990	12.04	5/8/1995	25.60	5/7/2000	14.82	5/8/2005	17.19
5/9/1985	2.53	5/9/1990	3.07	5/9/1995	24.60	5/8/2000	18.41	5/9/2005	17.25
5/10/1985	4.58	5/10/1990	11.93	5/10/1995	18.30	5/9/2000	16.82	5/10/2005	14.11
5/11/1985	4.15	5/11/1990	11.15	5/11/1995	20.65	5/10/2000	14.84	5/11/2005	22.56
5/12/1985	5.24	5/12/1990	13.24	5/12/1995	25.61	5/11/2000	7.83	5/12/2005	14.86



Lampiran 2. Data Kedalaman Laut

X	Y	Contour	X	Y	Contour	X	Y	Contour
759645	9410943	1	761302	9408438	1	758984	9411848	11
759732	9410981	1	761304	9408404	1	758960	9411793	11
759790	9411016	1	761309	9408333	1	758932	9411729	11
759785	9411098	1	761314	9408259	1	758900	9411656	11
759779	9411184	1	761320	9408211	1	758874	9411589	11
759721	9411219	1	761328	9408150	1	758868	9411571	11
759642	9411250	1	761336	9408085	1	758864	9411557	11
759593	9411250	1	761337	9408020	1	758844	9411491	11
759511	9411229	1	761331	9407957	1	758819	9411408	11
759443	9411213	1	761324	9407898	1	758808	9411345	11
759428	9411206	1	761320	9407843	1	758801	9411292	11
759422	9411199	1	761315	9407774	1	758794	9411237	11
759417	9411186	1	761310	9407707	1	758794	9411158	11
759393	9411124	1	761308	9407664	1	758801	9411103	11
759366	9411041	1	761308	9407641	1	758807	9411050	11
759377	9410992	1	759049	9412510	12	758819	9410989	11
759412	9410957	1	759050	9412496	12	758852	9410915	11
759468	9410939	1	759051	9412479	12	758882	9410852	11
759525	9410938	1	759050	9412396	12	758891	9410834	11
759580	9410936	1	759048	9412312	12	758926	9410787	11
762207	9409393	-8	759045	9412291	12	758963	9410740	11
762182	9409379	-8	759029	9412224	12	758976	9410727	11
762152	9409356	-8	759009	9412144	12	759023	9410686	11
762137	9409311	-8	758984	9412077	12	759063	9410651	11
762135	9409250	-8	758959	9412021	12	759070	9410646	11
762133	9409188	-8	758937	9411971	12	759120	9410604	11
762149	9409141	-8	758915	9411920	12	759206	9410541	11
762181	9409116	-8	758894	9411868	12	759262	9410505	11
762206	9409102	-8	758871	9411798	12	759330	9410476	11
758742	9412502	15	758860	9411759	12	759385	9410438	11
758743	9412465	15	758852	9411734	12	759409	9410346	11
758744	9412397	15	758832	9411674	12	759428	9410273	11
758745	9412328	15	758806	9411598	12	759428	9410273	11
758743	9412282	15	758785	9411527	12	759394	9410214	11
	412208	15	758769	9411470	12	759343	9410122	11
	412137	15	758756	9411418	12	759315	9410058	11
	412107	15	758743	9411358	12	759294	9409985	11
	412029	15	758736	9411286	12	759276	9409925	11
	411952	15	758730	9411217	12	759274	9409888	11



X	Y	Contour	X	Y	Contour	X	Y	Contour
758691	9411938	15	758730	9411178	12	759283	9409819	11
758690	9411932	15	758737	9411111	12	759294	9409744	11
758670	9411861	15	758745	9411038	12	759310	9409681	11
758645	9411773	15	758764	9410970	12	759322	9409631	11
758625	9411710	15	758780	9410922	12	759337	9409578	11
758609	9411661	15	758801	9410873	12	759353	9409502	11
758592	9411611	15	758830	9410810	12	759361	9409440	11
758570	9411540	15	758858	9410768	12	759368	9409382	11
758548	9411461	15	758897	9410716	12	759375	9409328	11
758531	9411396	15	758944	9410665	12	759382	9409255	11
758526	9411374	15	758990	9410619	12	759389	9409186	11
758518	9411283	15	759035	9410574	12	759393	9409153	11
758509	9411199	15	759086	9410533	12	759410	9409073	11
758509	9411198	15	759159	9410485	12	759426	9408997	11
758518	9411115	15	759208	9410441	12	759429	9408985	11
758528	9411024	15	759227	9410357	12	759430	9408979	11
758533	9410999	15	759245	9410283	12	759439	9408898	11
758547	9410932	15	759247	9410275	12	759449	9408810	11
758565	9410855	15	759247	9410273	12	759452	9408783	11
758589	9410786	15	759245	9410269	12	759447	9408701	11
758612	9410730	15	759211	9410211	12	759443	9408624	11
758636	9410681	15	759158	9410122	12	759443	9408604	11
758657	9410631	15	759130	9410058	12	759432	9408558	11
758676	9410588	15	759114	9409990	12	759414	9408483	11
758705	9410525	15	759100	9409930	12	759404	9408437	11
758731	9410475	15	759096	9409885	12	759398	9408416	11
758744	9410432	15	759102	9409818	12	759380	9408351	11
758749	9410371	15	759109	9409746	12	759358	9408272	11
758755	9410307	15	759118	9409687	12	759349	9408209	11
758750	9410249	15	759128	9409632	12	759347	9408153	11
758733	9410174	15	759139	9409574	12	759345	9408098	11
758719	9410109	15	759152	9409495	12	759348	9408028	11
758713	9410081	15	759159	9409443	12	759356	9407966	11
758699	9410023	15	759166	9409392	12	759362	9407907	11
758681	9409948	15	759175	9409322	12	759374	9407858	11
758673	9409914	15	759183	9409255	12	759397	9407769	11
	409897	15	759191	9409194	12	759413	9407695	11
	409824	15	759197	9409148	12	759415	9407690	11
	409742	15	759209	9409066	12	759417	9407679	11
	409693	15	759220	9408993	12	759422	9407658	11



X	Y	Contour	X	Y	Contour	X	Y	Contour
758624	9409634	15	759221	9408975	12	759826	9410941	2
758613	9409572	15	759223	9408889	12	759885	9410983	2
758597	9409496	15	759225	9408805	12	759921	9411040	2
758585	9409444	15	759223	9408790	12	759936	9411113	2
758572	9409395	15	759208	9408719	12	759951	9411174	2
758557	9409329	15	759190	9408635	12	759917	9411232	2
758535	9409245	15	759171	9408575	12	759841	9411296	2
758515	9409179	15	759155	9408526	12	759781	9411329	2
758512	9409165	15	759136	9408473	12	759701	9411345	2
758506	9409141	15	759114	9408403	12	759630	9411357	2
758477	9409077	15	759094	9408326	12	759604	9411357	2
758440	9409009	15	759078	9408262	12	759542	9411336	2
758397	9408959	15	759074	9408235	12	759463	9411311	2
758342	9408912	15	759073	9408153	12	759406	9411275	2
758269	9408894	15	759071	9408072	12	759361	9411222	2
758222	9408897	15	759075	9408048	12	759332	9411158	2
758175	9408900	15	759093	9407985	12	759321	9411102	2
758099	9408883	15	759114	9407906	12	759313	9411048	2
758049	9408834	15	759142	9407842	12	759335	9410978	2
758051	9408774	15	759179	9407770	12	759398	9410917	2
758089	9408693	15	759203	9407713	12	759460	9410886	2
758112	9408629	15	759217	9407686	12	759534	9410873	2
758120	9408616	15	759227	9407665	12	759597	9410861	2
758125	9408608	15	759234	9407648	12	759641	9410868	2
758166	9408556	15	758587	9412503	17	759699	9410886	2
758218	9408472	15	758587	9412452	17	759766	9410909	2
758249	9408411	15	758587	9412397	17	761835	9409879	-7
758289	9408337	15	758586	9412342	17	761841	9409890	-7
758318	9408274	15	758584	9412270	17	761841	9409900	-7
758325	9408255	15	758581	9412212	17	761834	9409912	-7
758337	9408231	15	758578	9412154	17	761822	9409916	-7
758369	9408179	15	758572	9412092	17	761808	9409903	-7
758410	9408104	15	758563	9412023	17	761810	9409889	-7
758443	9408045	15	758555	9411959	17	761824	9409878	-7
758476	9407993	15	758547	9411920	17	761800	9412468	0.75
758511	9407936	15	758526	9411855	17	761744	9412340	0.75
	407895	15	758503	9411786	17	761654	9412156	0.75
	407842	15	758492	9411759	17	761550	9411980	0.75
	407763	15	758480	9411733	17	761431	9411825	0.75
	407714	15	758455	9411676	17	761311	9411678	0.75



X	Y	Contour	X	Y	Contour	X	Y	Contour
758698	9407701	15	758422	9411603	17	761187	9411515	0.75
758726	9407672	15	758394	9411538	17	761015	9411355	0.75
758662	9412503	16	758360	9411453	17	760816	9411214	0.75
758662	9412471	16	758335	9411390	17	760687	9411086	0.75
758663	9412396	16	758332	9411380	17	760641	9410917	0.75
758663	9412321	16	758327	9411359	17	760635	9410715	0.75
758662	9412287	16	758305	9411289	17	760649	9410538	0.75
758657	9412216	16	758279	9411217	17	760665	9410401	0.75
758652	9412142	16	758269	9411172	17	760696	9410282	0.75
758646	9412093	16	758270	9411105	17	760740	9410196	0.75
758636	9412034	16	758269	9411041	17	760821	9410087	0.75



Lampiran 3. Tinggi dan Perioda gelombang laut lepas

1985-1990		1990-1995		1995-2000		2000-2005		2005-2010		2010-2015	
H0	Tp	H0	Tp	H0	Tp	H0	Tp	H0	Tp	H0	Tp
0.51	2.62	0.57	2.62	0.38	2.89	0.42	2.45	0.33	2.26	0.54	2.58
0.98	3.96	0.17	1.75	0.61	2.68	0.58	2.74	0.04	1.09	0.39	2.31
0.49	2.49	0.06	1.28	0.69	2.80	0.42	2.47	0.20	1.91	0.34	2.22
0.51	3.19	0.61	3.38	0.62	3.39	0.55	2.59	0.17	1.82	0.51	2.53
0.45	2.43	0.17	1.75	0.15	1.69	0.69	2.79	0.10	1.46	0.30	2.12
0.41	2.34	0.23	1.95	0.36	2.24	0.25	2.52	0.48	2.48	0.29	2.08
1.27	4.31	0.74	2.86	0.31	2.14	0.29	2.09	0.32	2.25	0.38	2.88
0.47	2.55	0.43	2.39	0.31	2.15	0.31	2.21	0.50	2.62	0.39	2.31
0.34	2.30	0.27	2.13	0.23	1.94	0.49	2.59	0.71	3.55	0.44	2.41
0.34	2.22	0.48	2.57	0.11	1.60	0.24	2.03	0.83	3.75	0.89	3.05
0.83	3.09	0.04	1.09	0.13	1.60	0.42	2.46	0.04	1.11	0.69	2.79
1.01	4.01	0.17	1.74	0.16	1.72	0.57	2.72	0.03	1.04	1.33	4.38
0.81	3.07	0.27	2.04	1.74	4.80	0.51	2.63	0.66	3.47	1.79	4.84
0.58	2.75	0.25	2.07	0.80	3.70	0.33	2.28	0.15	1.76	0.82	3.73
0.78	3.02	0.33	2.27	0.49	2.59	0.43	2.48	0.45	2.52	1.65	4.71
0.57	2.73	1.27	4.32	0.29	2.17	0.28	2.14	0.35	2.31	0.87	3.81
1.51	4.58	0.93	3.90	0.37	2.35	0.16	2.15	0.35	2.32	0.55	2.60
0.68	2.89	0.07	1.32	0.58	2.73	0.59	2.76	0.79	3.68	0.51	2.52
0.58	2.74	0.84	3.76	0.36	2.26	0.78	3.03	0.14	1.72	0.63	2.71
0.28	2.14	0.45	2.52	0.23	1.94	1.11	3.40	0.66	2.86	0.70	2.82
0.93	3.08	0.24	2.03	0.62	2.80	0.58	2.75	0.97	3.25	0.63	2.72
1.47	4.53	0.28	2.60	0.30	2.12	0.78	3.02	0.34	2.29	0.31	2.15
1.21	4.25	0.17	2.22	0.60	3.36	0.78	3.02	0.29	2.09	0.42	2.38
1.37	4.42	0.27	2.12	0.38	2.38	0.42	2.46	0.08	1.44	0.50	2.52
0.40	2.43	0.48	2.57	0.68	3.51	0.26	2.10	0.23	1.93	0.59	2.66
0.64	2.83	0.51	2.62	0.12	1.55	0.37	2.35	0.10	1.47	0.37	2.27
0.87	3.14	0.68	2.89	0.43	2.48	0.27	2.11	0.09	1.40	0.55	2.60
1.76	4.81	1.02	4.02	0.39	2.39	0.25	2.00	0.17	1.81	0.36	2.25
2.02	5.04	0.50	2.51	0.49	2.60	0.31	2.15	0.34	2.30	0.31	2.15
1.81	4.86	0.66	2.76	0.42	2.47	0.44	2.51	0.12	1.57	0.27	2.05
0.72	3.57	0.47	2.47	0.33	2.27	0.77	3.01	0.54	2.68	0.55	2.59
0.80	2.93	0.67	2.77	0.56	2.61	0.32	2.73	1.53	4.59	0.69	2.91
0.78	2.91	0.33	2.19	0.45	2.42	0.67	3.50	0.64	3.43	0.91	3.19
1.40	4.46	0.19	1.80	0.56	2.61	0.49	2.50	0.90	3.17	0.70	2.91
0.54	2.57	0.17	1.83	0.15	1.69	0.56	2.61	0.59	2.76	0.66	2.87
0.61	2.68	0.81	3.71	0.20	1.84	0.74	2.86	0.58	2.74	0.81	3.72
1.35	4.40	0.46	2.44	0.34	2.29	0.49	2.50	0.37	2.27	1.02	4.01
0.79	2.92	0.76	2.88	0.82	3.08	0.48	2.57	0.79	3.69	0.19	1.89



1985-1990		1990-1995		1995-2000		2000-2005		2005-2010		2010-2015	
H0	Tp	H0	Tp	H0	Tp	H0	Tp	H0	Tp	H0	Tp
0.55	2.59	1.02	3.18	0.20	1.92	0.86	3.79	0.58	2.74	1.33	4.38
0.47	2.46	0.55	2.59	0.25	2.06	0.40	2.42	0.41	2.95	1.11	4.12
0.70	2.81	0.87	3.02	0.42	2.36	0.17	1.81	0.42	2.37	0.52	2.55
0.52	2.54	0.63	2.71	0.34	2.79	0.31	2.71	0.80	2.93	0.38	2.39
0.79	3.69	0.83	2.98	0.23	2.01	0.14	1.64	1.00	3.16	0.17	1.75
0.45	2.42	0.88	3.03	0.32	2.16	0.03	0.99	1.22	3.38	0.33	2.27
0.61	2.69	0.92	3.08	0.38	2.39	0.32	2.17	0.82	2.96	0.91	3.87
0.57	2.73	0.77	2.90	0.27	2.12	0.36	2.84	0.75	2.88	1.07	4.08
0.46	3.07	0.43	2.38	0.17	1.82	0.04	1.04	0.62	2.71	0.61	2.78
0.22	1.92	0.07	1.33	0.29	2.17	0.41	2.45	0.84	2.98	0.61	3.37
0.66	2.86	0.79	2.93	0.15	1.67	0.49	3.13	0.71	2.82	0.34	2.79
0.65	2.85	0.55	2.60	0.53	2.57	0.56	3.29	0.81	2.95	0.29	2.17
0.80	3.05	0.60	2.67	0.16	2.15	0.37	2.27	0.76	2.88	0.74	2.97
0.33	2.28	0.59	2.66	0.25	2.07	0.28	2.15	0.31	2.14	1.03	4.02
0.60	2.66	0.32	2.17	0.75	2.99	0.14	1.66	0.62	2.69	0.40	2.43
0.63	2.71	0.26	2.01	0.62	3.41	0.37	2.26	0.72	2.83	0.60	2.77
0.85	3.00	0.64	2.84	0.53	2.56	0.27	2.12	0.49	2.50	0.59	2.76
0.61	2.68	0.60	3.36	0.45	2.43	0.72	3.58	0.54	2.58	0.67	2.87
0.35	2.23	0.11	1.59	0.30	2.12	0.27	2.12	1.03	3.20	0.64	2.84
0.15	1.75	0.52	2.65	0.13	1.66	0.93	3.90	0.88	3.03	0.67	2.88
0.30	2.21	0.73	2.96	0.70	3.53	0.24	2.03	1.07	3.24	0.64	2.83
0.13	1.65	0.51	2.63	0.22	1.91	0.37	2.37	0.22	1.91	0.87	3.14
0.23	1.93	1.58	4.64	0.45	2.43	1.14	3.43	0.18	1.86	0.50	2.60
0.15	1.66	1.50	4.56	0.62	3.41	0.86	3.12	0.38	2.38	0.62	2.80
0.07	1.38	1.05	4.05	0.37	2.36	0.75	2.98	0.63	2.82	0.77	3.01
0.34	2.21	0.39	2.32	0.17	1.74	0.56	2.71	0.88	3.16	0.32	2.26
0.30	2.11	0.32	2.17	0.24	1.96	0.56	2.71	0.47	2.56	0.43	2.48
0.09	1.41	0.85	3.12	0.31	2.24	0.56	2.71	0.82	3.07	0.07	1.31
1.04	3.33	0.74	2.98	0.63	3.42	0.37	2.36	0.63	3.41	1.21	4.25
1.16	3.45	0.86	3.13	0.52	2.54	0.52	2.65	0.48	2.57	0.55	2.59
0.68	2.89	0.94	3.90	0.70	2.81	0.38	2.37	1.11	3.41	0.74	3.61
1.09	4.10	0.09	1.47	0.60	2.67	0.50	2.61	0.62	2.81	0.66	2.86
0.74	2.86	0.18	1.77	0.83	2.97	0.41	2.44	0.26	2.01	0.55	3.26
0.31	2.15	0.37	2.87	0.30	2.11	0.60	2.77	0.25	2.07	0.34	2.21
0.59	2.65	0.59	2.76	0.82	2.97	0.92	3.19	0.63	2.81	0.82	3.73
0.56	2.61	1.63	4.69	0.60	3.36	0.66	2.87	0.59	2.75	0.89	3.83
0.69	2.80	1.28	4.33	0.70	3.54	0.80	3.06	0.30	2.19	0.40	2.95
0.68	2.79	1.24	4.28	0.65	2.74	1.21	3.50	0.65	2.85	0.12	1.61
0.49	2.50	0.92	3.08	0.99	3.15	0.81	3.06	0.06	1.31	0.14	1.71



1985-1990		1990-1995		1995-2000		2000-2005		2005-2010		2010-2015	
H0	TP	H0	TP	H0	TP	H0	TP	H0	TP	H0	TP
0.52	2.55	0.79	2.92	0.50	2.51	0.21	1.89	0.21	1.87	0.08	1.43
0.42	2.37	0.80	2.94	0.42	2.36	0.20	1.92	0.35	2.81	0.13	1.65
0.20	1.85	0.65	2.74	0.35	2.24	0.27	2.04	0.18	1.85	0.43	2.49
0.20	1.85	1.24	4.28	1.28	4.33	0.47	2.46	0.31	2.23	0.24	2.03
0.65	3.45	1.08	4.09	0.78	2.91	0.49	2.49	0.09	1.82	0.39	2.91
0.75	2.88	1.09	4.10	0.77	2.91	0.41	2.96	0.28	2.14	0.72	3.57
0.57	2.62	0.52	2.55	1.16	3.33	0.67	2.87	0.04	1.16	0.90	3.86
0.32	2.16	0.69	2.80	0.98	3.15	0.35	2.22	0.50	2.51	0.08	1.41
0.65	2.73	0.89	3.04	0.65	2.74	0.27	2.04	1.01	4.00	0.31	2.23
0.55	2.59	1.11	3.28	0.84	2.99	0.18	1.78	0.33	2.18	0.52	2.65
0.65	2.74	1.12	3.28	0.54	2.57	0.36	2.84	0.93	3.89	0.64	2.83
0.34	2.21	1.09	3.26	0.24	1.97	0.43	3.00	0.60	2.67	0.65	2.85
0.22	1.91	1.22	3.38	0.42	2.38	0.43	2.39	0.94	3.90	0.66	2.86
0.68	2.89	0.51	2.53	0.66	3.47	0.30	2.19	1.48	4.54	0.99	3.98
1.05	4.06	0.82	2.96	0.25	1.98	0.49	3.14	0.78	3.66	1.25	4.30
0.41	2.35	0.32	2.15	0.15	1.74	0.50	2.51	0.48	2.57	0.52	2.55
0.31	2.14	0.50	2.52	0.37	2.36	0.61	2.78	0.46	2.53	1.47	4.53
0.67	2.76	0.72	2.84	0.61	2.78	0.36	2.34	1.00	3.99	0.88	3.04
0.16	1.71	0.73	2.85	0.63	2.82	0.50	2.61	0.47	2.56	0.83	2.97
0.70	2.80	0.64	2.73	0.77	3.02	0.63	2.82	0.86	3.13	0.52	2.55
0.61	2.68	0.31	2.13	0.48	2.57	0.90	3.17	0.51	2.62	0.59	2.66
0.19	1.82	0.59	2.65	0.50	2.61	0.77	3.01	0.94	3.21	1.04	4.03
0.49	2.49	0.86	3.00	0.23	1.95	0.62	2.80	0.56	2.71	0.45	2.43
0.40	2.34	0.69	2.80	0.33	2.18	0.26	2.10	0.52	2.64	0.49	2.50
0.56	2.61	0.79	2.92	0.21	2.36	0.41	2.35	0.42	2.47	1.26	4.30
1.25	4.29	0.78	2.92	0.93	3.89	0.60	3.37	0.40	2.43	0.38	2.30
1.18	4.21	0.69	2.80	0.89	3.83	1.01	3.29	0.26	2.02	0.34	2.21
1.05	4.05	0.37	2.27	0.35	2.23	0.21	1.95	0.20	1.92	0.69	2.80
1.07	4.08	0.66	2.76	0.62	2.70	0.77	3.02	0.69	3.52	0.51	2.53
1.38	4.44	0.71	2.82	0.43	2.39	1.21	3.50	0.93	3.90	1.45	4.51
0.47	2.55	0.26	2.02	0.65	2.74	0.44	2.49	1.32	4.37	0.71	3.56
0.13	1.65	0.42	2.37	0.95	3.11	0.60	2.78	1.64	4.70	1.72	4.78
0.28	2.08	0.45	2.42	0.88	3.03	0.58	2.74	1.85	4.90	1.90	4.94
0.21	1.89	0.57	2.62	0.94	3.10	0.44	2.50	0.94	3.10	1.04	4.04
0.40	2.34	0.39	2.30	0.66	2.75	1.06	4.07	0.95	3.11	0.25	1.99
0.69	2.80	0.41	2.36	0.76	2.88	0.35	2.31	0.83	2.97	0.70	2.81
0.48	2.47	0.35	2.23	0.54	2.58	0.05	1.19	0.80	2.93	0.94	3.10
0.35	2.22	0.55	2.60	0.67	2.76	0.83	3.75	1.60	4.66	0.79	2.92
0.47	2.47	0.61	2.68	0.90	3.84	0.67	2.77	1.61	4.67	0.97	3.13



1985-1990		1990-1995		1995-2000		2000-2005		2005-2010		2010-2015	
H0	TP	H0	TP	H0	TP	H0	TP	H0	TP	H0	TP
0.45	2.43	0.91	3.06	0.74	2.86	0.13	1.59	1.54	4.60	1.08	3.24
0.77	2.90	0.84	2.98	0.83	2.97	0.70	3.55	1.56	4.62	0.74	2.86
0.90	3.05	1.13	3.30	0.73	2.85	0.58	2.74	1.46	4.52	0.59	2.66
0.77	2.90	1.13	3.29	0.66	2.75	0.74	2.97	1.51	4.58	0.73	2.85
0.22	1.92	0.57	2.62	0.75	2.87	0.39	2.40	1.38	4.44	2.16	5.16
0.25	2.00	0.51	2.53	0.77	2.90	0.44	2.50	1.08	4.09	2.28	5.25
0.06	1.25	0.42	2.36	0.82	2.96	1.00	3.29	1.52	4.59	1.90	4.94
0.24	1.98	0.38	2.28	1.29	4.34	0.86	3.13	1.52	4.58	1.10	3.27
0.17	1.76	0.43	2.39	0.58	2.64	0.68	2.89	1.24	4.28	1.90	4.94
0.15	1.69	0.34	2.20	0.67	2.77	0.93	3.21	0.72	3.57	2.16	5.15
0.11	1.51	0.21	1.89	0.87	3.02	0.74	2.97	1.24	4.29	2.15	5.14
0.05	1.18	0.46	2.54	0.87	3.02	0.57	2.72	1.17	4.21	2.00	5.02
0.10	1.46	0.11	1.50	0.84	2.98	0.70	2.92	0.66	2.86	2.03	5.04
0.19	1.82	0.41	2.35	1.25	4.29	0.64	2.84	0.97	3.94	1.98	5.00
0.20	1.85	0.38	2.30	0.70	2.82	0.57	2.72	0.86	3.13	1.94	4.97
0.25	2.01	0.45	2.43	1.74	4.80	0.30	2.21	1.02	4.01	1.89	4.93
0.03	1.01	0.30	2.11	1.21	4.25	0.80	3.06	1.02	4.02	1.62	4.68
0.32	2.17	0.21	1.87	0.77	2.90	0.84	3.10	0.59	2.65	0.83	3.09
0.16	1.73	0.66	3.47	0.62	2.69	0.96	3.24	1.65	4.71	1.57	4.63
0.64	2.73	0.16	1.70	0.76	2.88	0.95	3.23	1.28	4.33	1.72	4.77
0.23	1.94	0.05	1.25	0.80	2.93	0.91	3.19	1.44	4.50	1.51	4.57
0.26	2.01	0.39	2.31	0.77	2.91	0.72	2.95	1.18	4.21	1.71	4.77
0.48	2.47	0.31	2.14	0.57	2.62	0.87	3.14	1.21	4.25	1.83	4.88
0.23	1.93	0.59	2.76	1.32	4.37	0.68	2.88	1.34	4.40	1.81	4.86
0.34	2.21	0.81	3.07	0.84	2.99	1.05	4.05	1.70	4.76	1.62	4.68
0.29	2.10	0.61	2.79	0.89	3.04	0.71	2.93	1.37	4.43	1.78	4.83
0.43	2.39	0.19	1.81	0.87	3.02	0.82	3.08	1.77	4.83	1.98	5.00
0.46	2.44	0.44	3.04	0.88	3.03	1.34	3.62	1.30	4.35	1.69	4.74
0.31	2.14	0.50	3.17	0.87	3.02	0.70	2.92	0.99	3.98	1.83	4.87
0.26	2.01	0.27	2.13	0.81	2.95	0.59	2.75	1.19	4.22	1.75	4.81
0.31	2.13	0.02	0.81	0.83	2.97	0.71	3.56	0.99	3.28	1.61	4.67
0.14	1.64	0.10	1.51	0.70	2.81	0.76	3.00	0.88	3.83	1.82	4.87
0.09	1.40	0.70	3.54	0.71	2.82	0.89	3.16	1.54	4.60	1.75	4.81
0.19	1.82	0.83	3.75	0.75	2.87	1.09	4.11	1.50	4.56	1.90	4.94
0.23	1.95	0.57	2.62	0.98	3.14	0.83	3.09	1.80	4.85	1.89	4.93
0.69	2.90	1.15	4.17	0.27	2.13	1.32	4.37	0.87	3.81	0.73	3.59
0.47	2.56	1.02	4.02	0.25	2.08	0.14	1.64	0.71	3.56	0.96	3.93
1.07	4.07	1.60	4.66	0.13	1.66	0.40	2.41	0.91	3.87	0.71	3.56
0.93	3.89	1.39	4.45	0.24	2.06	0.65	3.45	0.43	2.47	1.28	4.33



1985-1990		1990-1995		1995-2000		2000-2005		2005-2010		2010-2015	
H0	Tp	H0	Tp	H0	Tp	H0	Tp	H0	Tp	H0	Tp
0.92	3.20	0.76	2.89	0.32	2.24	0.28	2.08	0.72	3.57	0.96	3.94
1.54	4.61	0.85	2.99	0.38	2.39	0.80	3.70	0.66	2.87	1.06	4.06
1.60	4.66	0.87	3.02	0.53	2.66	0.58	3.33	0.39	2.39	0.55	2.59
1.12	4.14	0.64	2.73	0.24	2.03	0.45	3.07	0.73	3.60	0.53	2.56
1.25	4.29	0.62	2.70	0.24	2.03	0.05	1.22	0.34	2.29	0.45	2.42
1.23	4.27	0.66	2.75	0.62	2.81	0.57	2.62	0.53	2.67	0.64	2.84
1.30	4.36	1.15	4.17	0.47	2.55	0.66	2.86	0.60	2.77	0.89	3.84
1.62	4.68	1.50	4.57	0.46	2.54	0.33	2.28	0.57	3.31	0.89	3.83
0.52	2.55	0.68	2.78	0.48	2.57	0.33	2.75	0.58	3.32	0.44	2.41
0.60	2.67	0.58	2.63	0.46	2.54	0.30	2.12	0.27	2.05	0.40	2.34
0.71	2.82	0.66	2.76	0.36	2.34	0.50	3.16	0.82	3.08	0.77	3.65
0.65	2.74	0.67	2.77	0.34	2.30	0.68	3.50	0.32	2.24	0.83	3.75
0.53	2.56	0.65	2.74	0.65	2.85	0.83	3.75	0.56	2.71	0.84	3.76
0.81	3.72	0.69	2.80	0.52	2.65	0.87	3.80	1.08	3.37	0.47	3.09
1.17	4.21	0.61	2.68	0.42	2.47	1.13	4.15	0.64	2.84	0.81	3.72
1.17	4.20	0.70	2.80	0.61	3.38	0.78	3.67	0.34	2.29	0.52	2.55
0.82	3.73	1.77	4.83	0.33	2.26	0.51	2.63	0.44	2.50	0.33	2.19
1.58	4.64	1.58	4.65	0.22	1.98	0.23	1.93	0.71	2.94	0.68	2.79
1.55	4.62	1.89	4.93	0.41	2.45	0.97	3.95	0.80	3.05	0.40	2.33
1.22	4.26	0.76	2.88	0.23	2.00	0.56	2.61	0.44	2.50	0.57	2.63
0.97	3.95	0.73	2.85	0.44	2.50	0.99	3.98	0.64	2.83	0.39	2.32



Lampiran 4. Program Transformasi Gelombang

Sub Macro1()

```
Dim imax, imax1, jmax, jmax1, jHari, pHari, kn, hr, i, j, k, Z, hrke As Integer
Dim nHari As Double
Dim kelandaian, Phi, Grav, DelT, DDT, DDP, DDS, sdtGel0, perGel0, tiGel0 As Double
Dim sdtrad, frekGel0, cel0, pjgGel0, Gamma, kh2, HTan, pjgGelRef, sinSdt, cosSdt, pkh, HSin As Double
Dim ks, kr, isPecah, Dir, pl As Double
Dim H(105, 106), pjgGel(105, 106), cel(105, 106), SdtGel(105, 106), bilGel(105, 106), N(105, 106),
TiGel(105, 106) As Double
Dim HPecah(105), SdtPecah(105), TiPecah(105) As Double
Dim IPecah(105) As Double
Dim xp(105), yp(106) As Integer
Dim DDIR$, b$, ndT$, ndH$, ndS$, cd$
Dim PerOff(30), TiOff(30), SdtOff(30) As Double
```

```
DDIR$ = "D:\Macros Fd\Barat" ' DIRECTORY KERJA
```

```
imax = 104
imax1 = 105
jmax = 105
jmax1 = 106
```

```
kelandaian = 0.0033 ' Kemiringan Pantai
Phi = 22 / 7 ' Nilai Phi
Grav = 9.81 ' Percepatan Gravitasi
DelT = 1 ' Interval iterasi
jHari = 5 ' Jumlah hari simulasi
pHari = 1 ' Interval hari yang ingin dicetak
```

```
nHari = 1 / DelT ' Jumlah iterasi
kn = jHari * nHari ' Banyaknya waktu iterasi
hr = jHari ' Jumlah hari simulasi
```

```
Open DDIR$ + "BatimetriB.csv" For Input As #1
```

```
For j = jmax To 1 Step -1
  For i = 1 To imax Step 1
    Input #1, DH
    H(i, j) = DH
  Next i
Next j
Close #1
```

```
' Cek Garis Pantai
```

```
cp = 0
For i = 1 To imax Step 1
  For j = 2 To jmax - 1 Step 1
    If H(i, j - 1) = 0 And H(i, j) = 0 And H(i, j + 1) > 0 Then
      cp = cp + 1
      xp(cp) = i
      yp(cp) = j
    End If
  Next j
Next i
```

```
$ + "input laut dalam-B.csv" For Input As #1
elombang
```

```
-> Tinggi Gelombang
```



```

' Kolom 2 ---> Periode Gelombang
' Kolom 3 ---> Sudut Gelombang (Derajat)
While Not EOF(1)
Z = Z + 1
Input #1, DDT, DDP, DDS
TiOff(Z) = DDT
PerOff(Z) = DDP
SdtOff(Z) = DDS
Wend
Close #1

b$ = ","
Open DDIR$ + "has_ref_B2.txt" For Output As #2
Print #2, "Tinggi_Gel_Pch" + b$ + "Kedalaman_Gel_Pch" + b$ + "Sudut_Gel_Pch_(Radian)" + b$ +
"l_Pnt_2_Laut"

For k = 1 To kn
hrke = Int(k / nHari) 'Hitung hrke

'-----PERHITUNGAN PARAMETER GELOMBANG-----
tiGel0 = TiOff(hrke)      ' tinggi lombang laut dalam
perGel0 = PerOff(hrke)   ' periode glb laut dalam
sdtGel0 = SdtOff(hrke)   ' sudut glb laut dalam

sdtrad = sdtGel0 * Phi / 180 ' mengubah sudut menjadi radian
frekGel0 = 2 * Phi / perGel0 ' frekuensi sudut
cel0 = Grav * perGel0 / (2 * Phi) ' kec. glb awal (cepat rambat gelombang)
pjpgGel0 = cel0 * perGel0 ' panjang glb awal

'-----TINGGI GELOMBANG PECAH-----

Gamma = 0.78 ' Gamma= tinggi ombak pecah/kedalaman

'-----MULAI LOOPING PARAMETER GELOMBANG-----
BT$ = Chr(9)
Open DDIR$ + "Matrix_TinggiGel_B2.txt" For Output As #20
Print #20, "Data-i" + BT$ + "Data-j" + BT$ + "Tinggi_Gel" + BT$ + "Sudut_Gel"
For j = jmax To 1 Step -1 ' looping dari jmax sampai 1
For i = 1 To imax Step 1 ' looping dari 1 sampai imax
If H(i, j) > 0.01 Then ' jika kedalaman lebih besar dari 0,01 maka
LR: kh2 = 2 * Phi * H(i, j) / pjpgGel0 ' 2kh
HTan = (Exp(kh2) - Exp(-kh2)) / (Exp(kh2) + Exp(-kh2)) ' Hitung hiperbolic tangen
pjpgGelRef = (Grav * perGel0 * perGel0 / (2 * Phi)) * HTan ' panjang glb (L)
If Abs(pjpgGelRef - pjpgGel0) < 0.01 Then ' jika abs selisih pjpg glb < dari 0,01 maka
pjpgGel(i, j) = pjpgGelRef ' panjang glb (L)
cel(i, j) = pjpgGel(i, j) / perGel0 ' Kecepatan Glb
sinSdt = (Sin(sdtrad) / cel0) * cel(i, j) ' sdtrad = sudut dalam radian
cosSdt = ((1 - (sinSdt ^ 2)) ^ 0.5) '
SdtGel(i, j) = Atn(sinSdt / cosSdt) ' sudut Glb
bilGel(i, j) = 2 * Phi / pjpgGel(i, j) ' bilangan glb
pkh = bilGel(i, j) * H(i, j) ' cosSdt
HSin = (Exp(2 * pkh) - Exp(-2 * pkh)) / 2 ' Hitung hiperbolic sinus
N(i, j) = 0.5 * (1 + (2 * pkh / HSin)) '
Exp(pkh) - Exp(-pkh)) / (Exp(pkh) + Exp(-pkh)) ' Hitung hiperbolic tangen
(2 * N(i, j) * HTan) ^ 0.5 ' koef shoaling
(sdtrad / Cos(SdtGel(i, j))) ^ 0.5 ' koef refraksi
) = tiGel0 * ks * kr ' tinggi ombak yng telah terefraksi
, Trim(Str(i)) + BT$ + Trim(Str(j)) + BT$ + Trim(Str(TiGel(i, j))) + BT$ + Trim(Str(SdtGel(i, j)))
' jika selisih pjpg glb > dari 0,01 maka
= pjpgGelRef ' panjang glb = pjpgGelRef

```



```

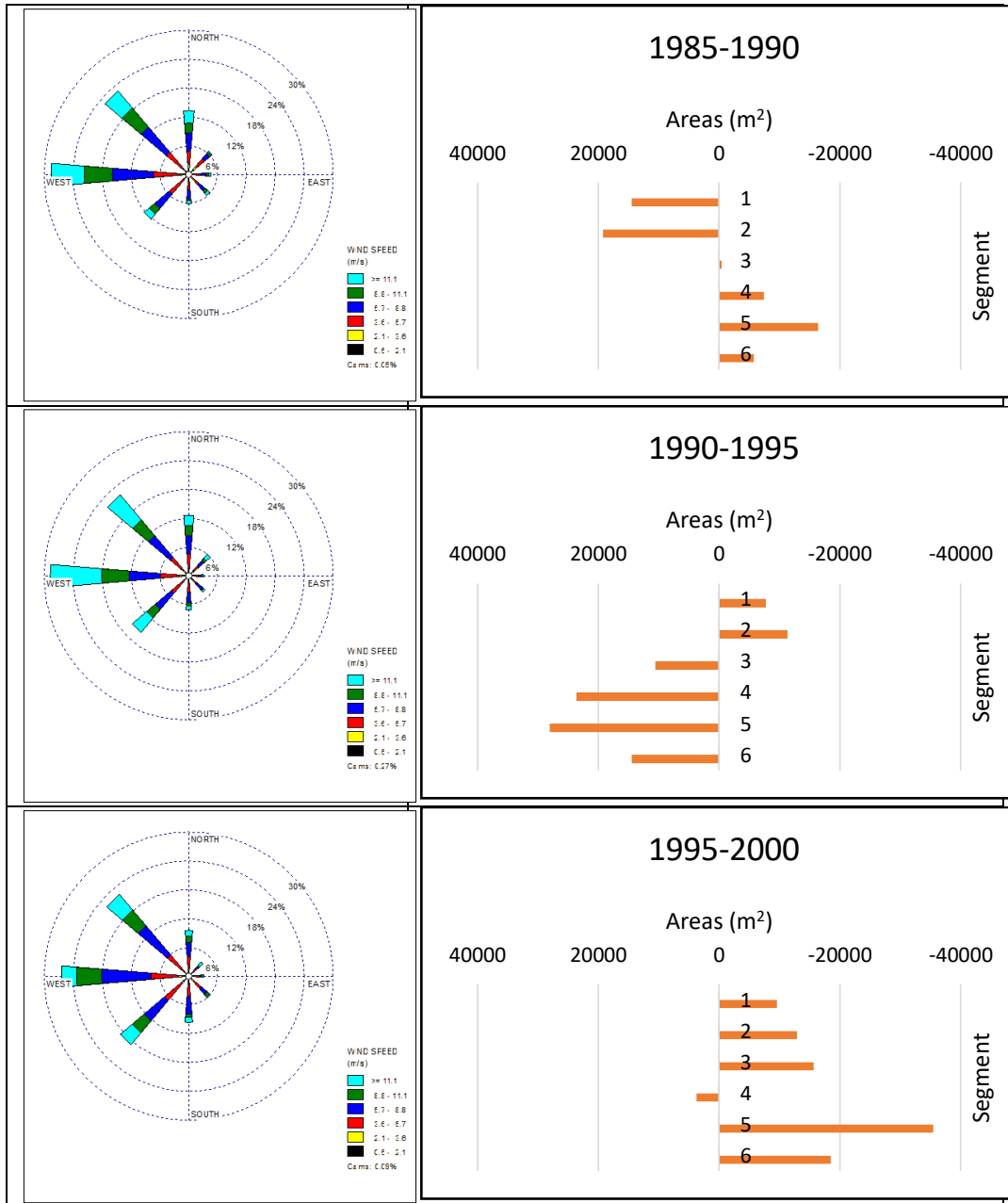
GoTo LR                ' ke kh2
End If                 ' menutup pilihan
End If                 ' menutup pilihan
Next i                 ' menutup looping
Next j                 ' menutup looping
Close #20
'----- hitung kedalaman gelombang pecah -----
For i = 1 To imax Step 1 ' looping i dari 1 s/d imax
isPecah = 0            ' mendefenisikan bhw belum ketemu gel pecah
For j = jmax To 1 Step -1 ' looping j dari jmax s/d 1
If H(i, j) > 0 And isPecah = 0 Then ' pilihan: jika ked lebih besar dari 0 dan belum ketemu gel
pecah maka
If TiGel(i, j) / H(i, j) > Gamma And isPecah = 0 Then ' pilihan: jika ting glb/ked lebih besar dari gamma
dan belum ketemu gel pecah maka
HPecah(i) = H(i, j) ' Kedalaman glb pecah = kedalaman air pada titik tersebut
SdtPecah(i) = SdtGel(i, j) ' sudut glb pecah = sudut glb pada titik tersebut
TiPecah(i) = TiGel(i, j) ' Tinggi glb pecah = tinggi glb pada titik tersebut
ndH$ = Trim(Str(HPecah(i))) ' Num2String Kedalaman Gel Pecah
ndS$ = Trim(Str(SdtPecah(i))) ' Num2String Sudut Gel Pecah
ndT$ = Trim(Str(TiPecah(i))) ' Num2String Tinggi Gel Pecah
cd$ = "1"
Print #2, ndT$ + b$ + ndH$ + b$ + ndS$ + b$ + cd$ ' Simpan hasil pada file"Gel_Ref30.txt"
IPecah(i) = j ' posisi glb pecah pada titik tersebut
isPecah = 1 ' Sdh ketemu glb pecah
GoTo Keluar ' keluar dari loop
End If ' menutup pilihan
Elseif isPecah = 0 Then ' selain itu jika belum ketemu glb pecah sampai grs pantai maka
HPecah(i) = H(i, j + 1) ' posisi glb pecah berada di 1 sel diluar garis pantai
TiPecah(i) = TiGel(i, j + 1)
SdtPecah(i) = SdtGel(i, j + 1)
ndH$ = Trim(Str(HPecah(i))) ' Num2String Kedalaman Gel Pecah
ndT$ = Trim(Str(TiPecah(i))) ' Num2String Tinggi Gel Pecah
ndS$ = Trim(Str(SdtPecah(i))) ' Num2String Sudut Gel Pecah
cd$ = "2"
Print #2, ndT$ + b$ + ndH$ + b$ + ndS$ + b$ + cd$ ' Simpan hasil pada file"Gel_Ref30.txt"
IPecah(i) = j + 1 ' posisi glb pecah pada titik tersebut
isPecah = 1 ' Sdh ketemu glb pecah
GoTo Keluar ' keluar dari loop
End If ' menutup pilihan
Next j ' menutup looping j
Keluar:
Next i ' menutup looping i
Next k ' menutup looping k
Close #2

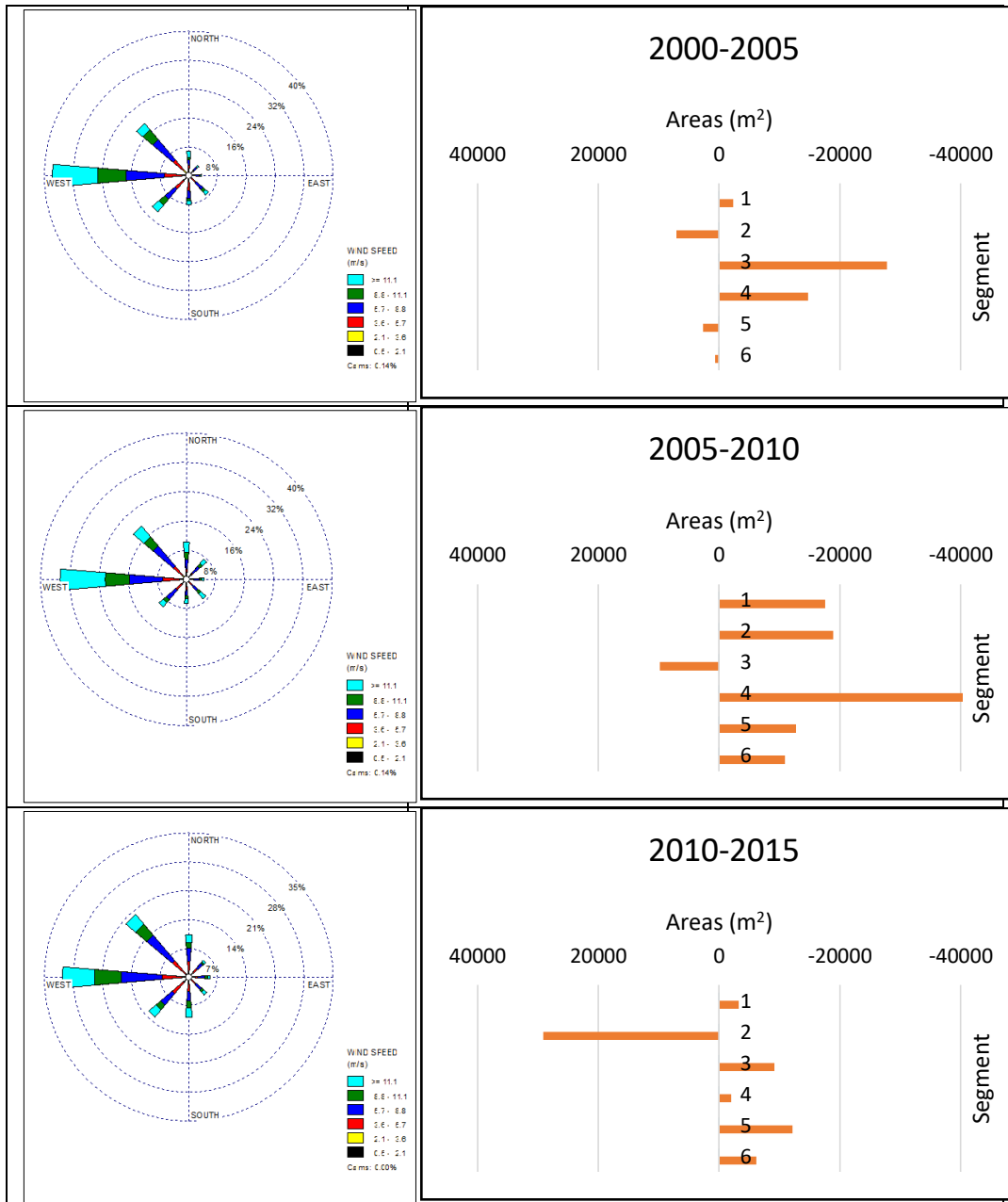
End Sub

```



Lampiran 6. Mawar Angin dengan Perubahan Luas Area 1985-2015





Lampiran 7. Geometri salient

Tahun	I (m)	λ (m)	ε (m)	η (m)	δ (m)
1985	163	4921	2394	1101	1189
1990	163	4921	2413	1123	1185
1995	163	4921	2473	1133	1206
2000	163	4921	2388	1087	1224
2005	163	4921	2323	1101	1275
2010	163	4921	2272	1163	1183
2015	163	4921	2250	1151	1067

1985				1990				1995			
η	ξ	η/σ	ξ/σ	η	ξ	η/σ	ξ/σ	η	ξ	η/σ	ξ/σ
44.5	-2912	0.04	-2.43	42.5	-2912	0.04	-2.41	40.5	-2912	0.03	-2.36
71.2	-2504	0.06	-2.09	69.2	-2504	0.06	-2.08	67.2	-2504	0.05	-2.03
116	-2285	0.10	-1.91	115	-2285	0.10	-1.89	114	-2285	0.09	-1.85
135	-2101	0.11	-1.76	134	-2101	0.11	-1.74	133	-2101	0.11	-1.70
207	-1907	0.17	-1.59	206	-1907	0.17	-1.58	205	-1907	0.17	-1.54
262	-1703	0.22	-1.42	261	-1703	0.22	-1.41	260	-1703	0.21	-1.38
359	-1480	0.30	-1.24	358	-1480	0.30	-1.23	357	-1480	0.29	-1.20
429	-1265	0.36	-1.06	428	-1265	0.35	-1.05	427	-1265	0.35	-1.02
510	-1059	0.43	-0.88	509	-1059	0.42	-0.88	508	-1059	0.41	-0.86
637	-860	0.53	-0.72	636	-860	0.53	-0.71	635	-860	0.51	-0.70
765	-642	0.64	-0.54	764	-642	0.63	-0.53	763	-642	0.62	-0.52
975	-441	0.81	-0.37	974	-441	0.81	-0.37	973	-441	0.79	-0.36
1119	-203	0.93	-0.17	1118	-203	0.93	-0.17	1117	-203	0.90	-0.16
1089	0	0.91	0.00	1123	0	0.93	0.00	1133	0	0.92	0.00
999	180	0.83	0.15	998	180	0.83	0.15	997	180	0.81	0.15
861	343	0.72	0.29	860	343	0.71	0.28	859	343	0.69	0.28
808	471	0.68	0.39	807	471	0.67	0.39	806	471	0.65	0.38
665	635	0.56	0.53	664	635	0.55	0.53	663	635	0.54	0.51
525	809	0.44	0.68	524	809	0.43	0.67	523	809	0.42	0.65
406	975	0.34	0.81	405	975	0.34	0.81	404	975	0.33	0.79
321	1178	0.27	0.98	320	1178	0.27	0.98	319	1178	0.26	0.95
237	1402	0.20	1.17	236	1402	0.20	1.16	235	1402	0.19	1.13
151	1588	0.13	1.33	150	1588	0.12	1.32	149	1588	0.12	1.28
94	1766	0.08	1.48	93	1766	0.08	1.46	92	1766	0.07	1.43
1983	0.00	1.66	1	1983	0.00	1.66	1	1983	0.00	1.66	1



2000				2005			
η	ξ	η/σ	ξ/σ	η	ξ	η/σ	ξ/σ
38.5	-2912	0.03	-2.44	36.5	-2912	0.03	-2.51
65.2	-2504	0.05	-2.10	63.2	-2504	0.05	-2.16
113	-2285	0.09	-1.91	112	-2285	0.10	-1.97
132	-2101	0.11	-1.76	131	-2101	0.11	-1.81
204	-1907	0.17	-1.60	203	-1907	0.17	-1.64
259	-1703	0.22	-1.43	258	-1703	0.22	-1.47
356	-1480	0.30	-1.24	355	-1480	0.31	-1.27
426	-1265	0.36	-1.06	425	-1265	0.37	-1.09
507	-1059	0.42	-0.89	506	-1059	0.44	-0.91
634	-860	0.53	-0.72	633	-860	0.54	-0.74
762	-642	0.64	-0.54	761	-642	0.66	-0.55
972	-441	0.81	-0.37	971	-441	0.84	-0.38
1116	-203	0.93	-0.17	1115	-203	0.96	-0.17
1087	0	0.91	0.00	1101	0	0.95	0.00
996	180	0.83	0.15	997	180	0.86	0.15
858	343	0.72	0.29	859	343	0.74	0.30
805	471	0.67	0.39	806	471	0.69	0.41
662	635	0.55	0.53	663	635	0.57	0.55
522	809	0.44	0.68	523	809	0.45	0.70
403	975	0.34	0.82	404	975	0.35	0.84
318	1178	0.27	0.99	319	1178	0.27	1.01
234	1402	0.20	1.17	235	1402	0.20	1.21
148	1588	0.12	1.33	149	1588	0.13	1.37
91	1766	0.08	1.48	92	1766	0.08	1.52
1	1983	0.00	1.66	1	1983	0.00	1.66



2010				2015			
η	ξ	η/σ	ξ/σ	η	ξ	η/σ	ξ/σ
34.5	-2912	0.03	-2.56	32.5	-2912	0.03	-2.59
61.2	-2504	0.05	-2.20	59.2	-2504	0.05	-2.23
111	-2285	0.10	-2.01	110	-2285	0.10	-2.03
130	-2101	0.11	-1.85	129	-2101	0.11	-1.87
202	-1907	0.18	-1.68	201	-1907	0.18	-1.70
257	-1703	0.23	-1.50	256	-1703	0.23	-1.51
354	-1480	0.31	-1.30	353	-1480	0.31	-1.32
424	-1265	0.37	-1.11	423	-1265	0.38	-1.12
505	-1059	0.44	-0.93	504	-1059	0.45	-0.94
632	-860	0.56	-0.76	631	-860	0.56	-0.76
760	-642	0.67	-0.57	759	-642	0.67	-0.57
970	-441	0.85	-0.39	969	-441	0.86	-0.39
1114	-203	0.98	-0.18	1113	-203	0.99	-0.18
1163	0	1.02	0.00	1151	0	1.02	0.00
999	180	0.88	0.16	1001	180	0.89	0.16
861	343	0.76	0.30	863	343	0.77	0.30
808	471	0.71	0.41	810	471	0.72	0.42
665	635	0.59	0.56	667	635	0.59	0.56
525	809	0.46	0.71	527	809	0.47	0.72
406	975	0.36	0.86	408	975	0.36	0.87
321	1178	0.28	1.04	323	1178	0.29	1.05
237	1402	0.21	1.23	239	1402	0.21	1.25
151	1588	0.13	1.40	153	1588	0.14	1.41
94	1766	0.08	1.55	96	1766	0.09	1.57
1	1983	0.00	1.66	1	1983	0.00	1.66

