

Appendix

Appendix

The tables with bold in their last rows show the average depth of the water in the flume



Figure A1. Smooth bed flume with irregularities.

Table A1. Summary of measured depths on the calibrated stilling pots at the given discharge for the smooth flume bed with irregularities.

Distance	Zeros	100-zeros	D1 (Q=60.2)	D2 (Q=89.8)	D3 (Q=111.7)	D4 (Q=134.6)	D5 (Q=155.1)
1.1	62.10	37.94	5.800	26.96	42.30	58.30	72.39
2.2	62.10	37.89	6.400	27.53	42.60	58.70	72.73
3.3	60.90	39.09	6.780	27.82	43.00	59.10	73.08
4.4	60.60	39.45	7.230	28.25	43.40	59.50	73.62
5.5	60.30	39.72	8.060	29.10	44.40	60.30	74.46
6.6	59.40	40.65	8.470	29.53	44.50	60.70	74.82
7.7	58.60	41.39	9.240	30.24	45.30	61.40	75.62
8.8	58.00	42.05	9.780	30.86	45.80	62.00	76.15
9.9	57.70	42.32	10.59	31.47	46.60	62.40	76.63
11.0	56.20	43.79	12.03	33.23	48.60	64.70	78.55

Appendix

Table A2. Summary of the normalised depth in metres against the stilling pots for smooth flume with irregularities bed after applying procedure for table 4.2

D1e	D2e	D3e	D4e	D5e
0.068	0.089	0.104	0.120	0.134
0.069	0.090	0.105	0.121	0.135
0.068	0.089	0.104	0.120	0.134
0.068	0.089	0.104	0.120	0.134
0.068	0.089	0.105	0.121	0.135
0.068	0.089	0.104	0.120	0.134
0.068	0.089	0.104	0.120	0.134
0.068	0.089	0.104	0.120	0.134
0.068	0.089	0.104	0.120	0.134
0.068	0.089	0.104	0.120	0.134
0.068	0.089	0.105	0.121	0.135
0.068	0.089	0.104	0.120	0.134

Q(m ³ /s)	D(m)
51.4	0.068
83.7	0.089
106	0.104
129	0.120
151	0.134
Analysis	
60.0	0.074

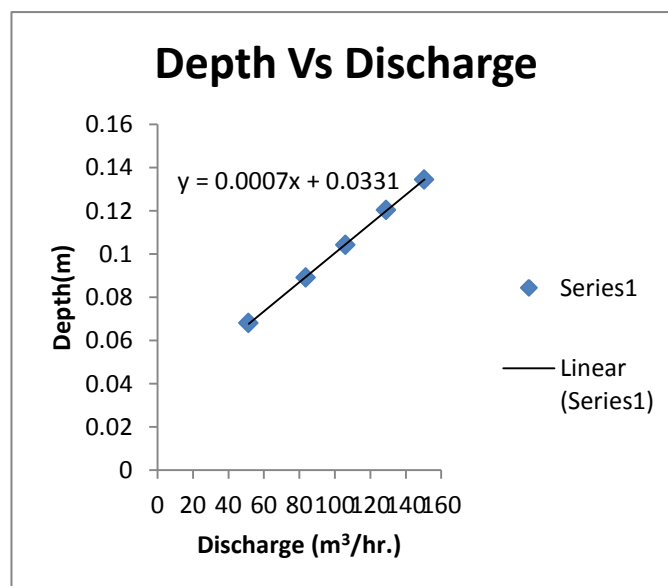


Figure A2. Stage-discharge graph for smooth bed flume with irregularities.

Appendix



Figure A3. Smooth bed flume with obstructions

Table A3 Summary of measured depths on the calibrated stilling pots at the given discharge for the smooth channel with obstruction.

Distance	Zeros		D1 (Q=49.6)	D2 (Q=71.1)	D3 (Q=86.8)	D4(=107.5)	D5 (Q=125.8)
1.1	61.45	38.55	18.37	41.31	61.40	81.52	103.2
2.2	61.50	38.50	18.97	42.07	61.99	82.16	103.9
3.3	60.30	39.70	19.47	42.65	62.50	82.52	104.4
4.4	59.94	40.06	19.90	43.06	63.04	82.97	105.0
5.5	59.67	40.33	20.74	43.80	63.78	83.74	105.8
6.6	58.74	41.26	21.28	44.40	64.34	84.22	106.4
7.7	58.00	42.00	21.97	45.08	64.98	84.99	107.1
8.8	57.34	42.66	22.61	45.73	65.62	85.64	107.7
9.9	57.07	42.93	23.43	46.18	66.41	86.49	108.5
11	55.60	44.40	24.12	47.31	67.04	87.34	108.7

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Table A4 Summary of the normalised depth in metres against the stilling pots for smooth flume with obstructions bed after applying procedure for table 4.2

D1e	D2e	D3e	D4e	D5e
0.080	0.103	0.123	0.143	0.165
0.080	0.104	0.123	0.144	0.165
0.080	0.103	0.123	0.143	0.165
0.080	0.103	0.123	0.143	0.165
0.080	0.103	0.123	0.143	0.165
0.080	0.103	0.123	0.143	0.165
0.080	0.103	0.123	0.143	0.165
0.080	0.103	0.123	0.143	0.165
0.081	0.103	0.123	0.144	0.166
0.080	0.103	0.111	0.143	0.164
0.080	0.103	0.122	0.143	0.165

Q(m ³ /r)	D(m)
49.6	0.080
71.1	0.103
86.8	0.122
108	0.143
126	0.165
Analysis	
60.0	0.092

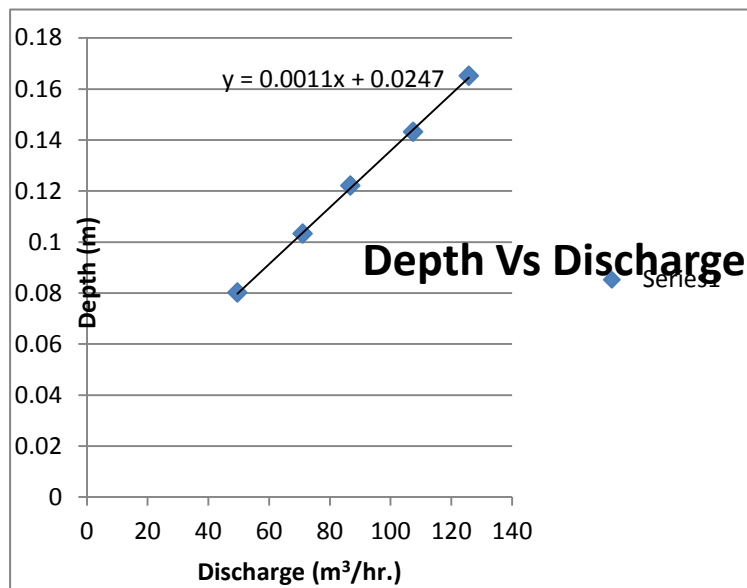


Figure A4. Stage-discharge graph for smooth bed flume with obstructions.

Appendix



Figure A5 smooth bed flume with vegetation

Table A5. Summary of measured depths on the calibrated stilling pots at the given discharge for the smooth channel with vegetation.

Distance	Zeros	100-zeros	D1 (Q=51.4)	D2 (Q=83.7)	D3 (Q=106.1)	D4 (Q=128.9)	D5 (Q=150.5)
1.1	62.10	37.94	5.800	26.96	42.28	58.30	72.39
2.2	62.10	37.89	6.400	27.53	42.63	58.70	72.73
3.3	60.90	39.09	6.780	27.82	42.99	59.10	73.08
4.4	60.60	39.45	7.230	28.25	43.36	59.50	73.62
5.5	60.30	39.72	8.060	29.10	44.35	60.30	74.46
6.6	59.40	40.65	8.470	29.53	44.53	60.70	74.82
7.7	58.60	41.39	9.240	30.24	45.32	61.40	75.62
8.8	58.00	42.05	9.780	30.86	45.84	62.00	76.15
9.9	57.70	42.32	10.59	31.47	46.64	62.40	76.63
11	56.20	43.79	12.03	33.23	48.64	64.70	78.55

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Table A6. Summary of the normalised depth in metres against the stilling pots for smooth flume with obstructions bed after applying procedure for table 4.2

D1e	D2e	D3e	D4e	D5e
0.077	0.092	0.109	0.127	0.142
0.078	0.093	0.109	0.127	0.143
0.077	0.092	0.108	0.127	0.142
0.077	0.092	0.108	0.127	0.142
0.077	0.093	0.109	0.127	0.142
0.077	0.092	0.109	0.127	0.142
0.077	0.092	0.108	0.127	0.142
0.077	0.092	0.108	0.126	0.141
0.077	0.093	0.109	0.127	0.142
0.077	0.092	0.109	0.127	0.143

Q(M3/Hr)	D(m)
32.5	0.0600
45.0	0.0680
56.2	0.0780
65.1	0.0850
85.0	0.1000
Analysis	
60	0.08

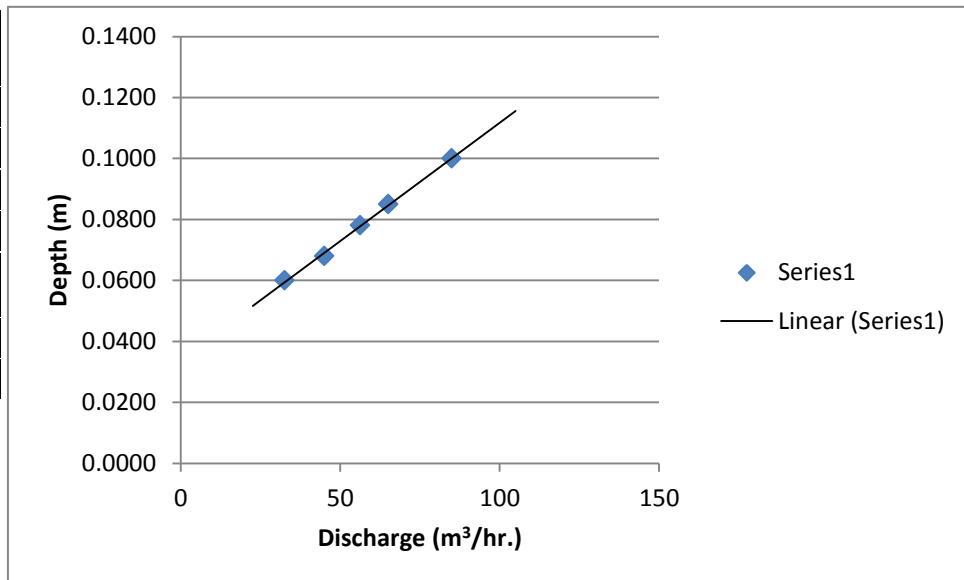


Figure A6. Stage-discharge graph for smooth bed flume with vegetation.

Appendix



Figure A7. Smooth bed flume with irregularities and obstructions.

Table A7 Summary of measured depths on the calibrated stilling pots at the given discharge for the smooth channel with irregularities and obstructions.

SMOOTH CHANNEL WITH IRREGULARITIES AND OBSTRUCTIONS							
Distance	Zeros		D1 (Q=43.5)	D2 (Q=66.9)	D3 (Q=89.6)	D4 (Q=108)	D5 (Q=21.6)
1.1	61.45	38.55	36.45	66.34	92.36	119.4	10.77
2.2	61.50	38.50	37.00	66.83	92.87	119.6	11.32
3.3	60.30	39.70	37.60	67.33	93.36	120.3	11.99
4.4	59.94	40.06	38.02	67.79	93.96	120.7	12.53
5.5	59.67	40.33	38.88	68.62	94.66	121.2	13.23
6.6	58.74	41.26	39.36	69.20	95.07	121.9	13.88
7.7	58.00	42.00	40.01	69.79	95.86	122.6	14.65
8.8	57.34	42.66	40.74	70.23	96.34	123.3	15.23
9.9	57.07	42.93	41.65	71.33	97.26	124.1	15.89
11	55.60	44.40	42.05	72.23	98.21	125.2	16.43

Appendix

Table A8. Summary of the normalised depth in metres against the stilling pots for smooth flume with obstructions bed after applying procedure for table 4.2

D1e	D2e	D3e	D4e	D5e
0.098	0.128	0.154	0.181	0.072
0.099	0.128	0.154	0.181	0.073
0.098	0.128	0.154	0.181	0.072
0.098	0.128	0.154	0.181	0.073
0.099	0.128	0.154	0.181	0.073
0.098	0.128	0.154	0.181	0.073
0.098	0.128	0.154	0.181	0.073
0.098	0.128	0.154	0.181	0.073
0.099	0.128	0.154	0.181	0.073
0.098	0.128	0.154	0.181	0.072
0.098	0.128	0.154	0.181	0.073

Q(m ³ /hr)	D(m)
43.5	0.098
66.9	0.128
89.6	0.154
108	0.181
21.6	0.073
Analysis	
60.0	0.119

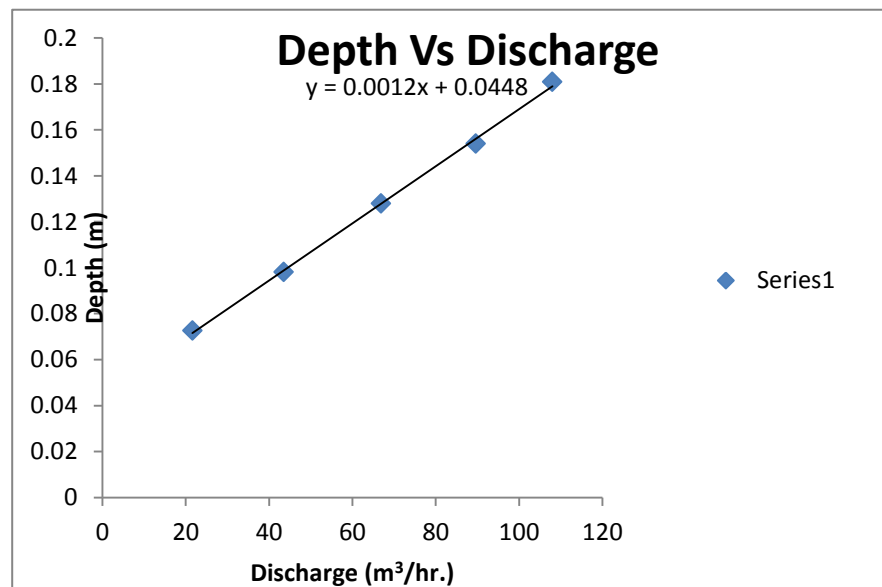


Figure A8. stage-discharge graph for smooth bed flume with irregularities and obstructions.

Appendix



Figure A9. Smooth bed flume with irregularities and vegetation.

Table A9. Summary of measured depths on the calibrated stilling pots at the given discharge for the smooth channel with irregularities and vegetation.

SMOOTH CHANNEL WITH IRREGULARITIES AND VEGETATION							
Distance	Zeros	100-zeros	D1 (Q=43.7)	D2 (Q=60)	D3 (Q=74.6)	D4 (Q=99.3)	D5 (Q=116.9)
1.1	61.45	38.55	11.05	28.50	46.77	72.16	93.32
2.2	61.50	38.50	11.48	29.09	47.32	72.65	93.75
3.3	60.30	39.70	11.92	29.64	47.85	73.10	94.39
4.4	59.94	40.06	12.30	30.01	48.21	73.53	94.84
5.5	59.67	40.33	12.88	30.61	48.87	74.19	95.54
6.6	58.74	41.26	13.17	31.02	49.15	74.45	95.77
7.7	58.00	42.00	13.62	31.60	49.81	75.08	96.40
8.8	57.34	42.66	14.36	32.22	50.43	75.68	96.97
9.9	57.07	42.93	15.26	33.10	51.50	76.72	97.98
11	55.60	44.40	17.92	35.03	53.22	78.73	99.70

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Table A10. Summary of the normalised depth in metres against the stilling pots for smooth flume with obstructions bed after applying procedure for table 4.2

D1e	D2e	D3e	D4e	D5e
0.073	0.090	0.108	0.134	0.155
0.073	0.091	0.109	0.134	0.155
0.072	0.090	0.108	0.133	0.155
0.072	0.090	0.108	0.134	0.155
0.073	0.090	0.109	0.134	0.155
0.072	0.090	0.108	0.133	0.155
0.072	0.090	0.108	0.133	0.154
0.072	0.090	0.108	0.133	0.154
0.072	0.090	0.109	0.134	0.155
0.074	0.091	0.109	0.134	0.155
0.072	0.090	0.108	0.134	0.155

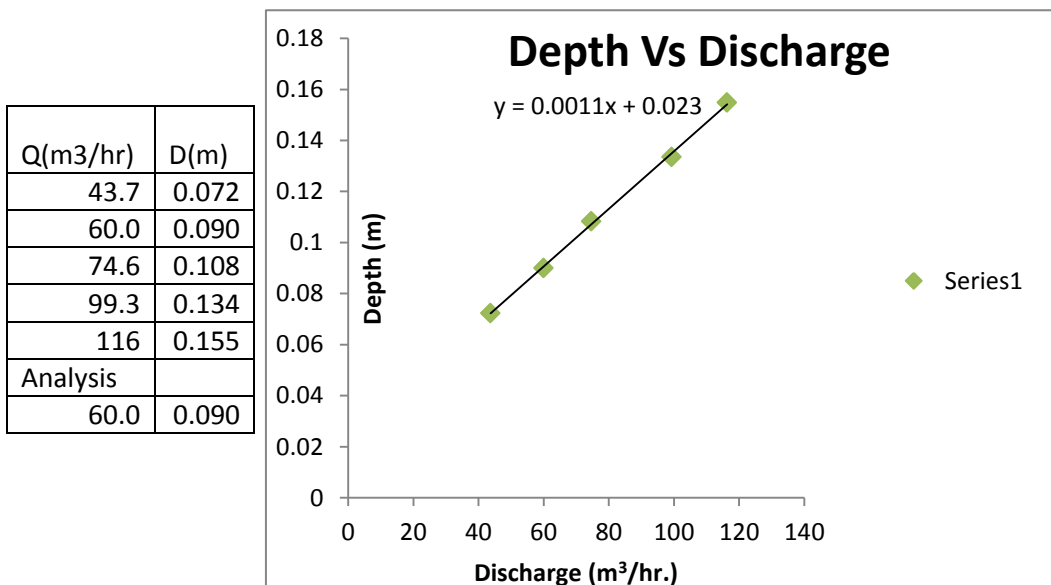


Figure A10. Stage-discharge graph for smooth bed flume with irregularities and obstructions

Appendix



Figure A11. Smooth bed flume with combination of obstructions and vegetation.

Table A11. Summary of measured depths on the calibrated stilling pots at the given discharge for the smooth channel with obstruction and vegetation.

Smooth channel with vegetation and obstructions							
Distance	Zeros		D1 (Q=58)	D2 (Q=50.9)	D3 (Q=65.4)	D4 (Q=81.1)	D5 (Q=92.9)
1.1	61.45	38.55	60.10	42.96	72.03	104.1	135.0
2.2	61.50	38.50	60.62	43.51	72.59	104.5	135.5
3.3	60.30	39.70	61.37	43.93	73.11	105.1	136.1
4.4	59.94	40.06	61.89	44.44	73.54	105.5	136.6
5.5	59.67	40.33	62.69	44.63	74.72	106.6	137.2
6.6	58.74	41.26	63.21	45.94	74.99	107.0	137.6
7.7	58.00	42.00	63.80	46.67	75.58	107.6	138.2
8.8	57.34	42.66	64.69	46.93	76.13	108.2	139.0
9.9	57.07	42.93	65.11	47.81	77.02	109.1	139.9
11	55.60	44.40	65.89	48.74	77.81	109.8	141.0

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Table A12. Summary of the normalised depth in metres against the stilling pots for smooth flume with obstructions bed after applying procedure for table 4.2

D1e	D2e	D3e	D4e	D5e
0.122	0.104	0.134	0.166	0.196
0.122	0.105	0.134	0.166	0.197
0.122	0.104	0.133	0.165	0.196
0.122	0.104	0.134	0.166	0.197
0.122	0.104	0.134	0.166	0.197
0.122	0.105	0.134	0.166	0.196
0.122	0.105	0.134	0.166	0.196
0.122	0.104	0.134	0.166	0.196
0.122	0.105	0.134	0.166	0.197
0.122	0.104	0.133	0.165	0.197
0.122	0.105	0.134	0.166	0.197

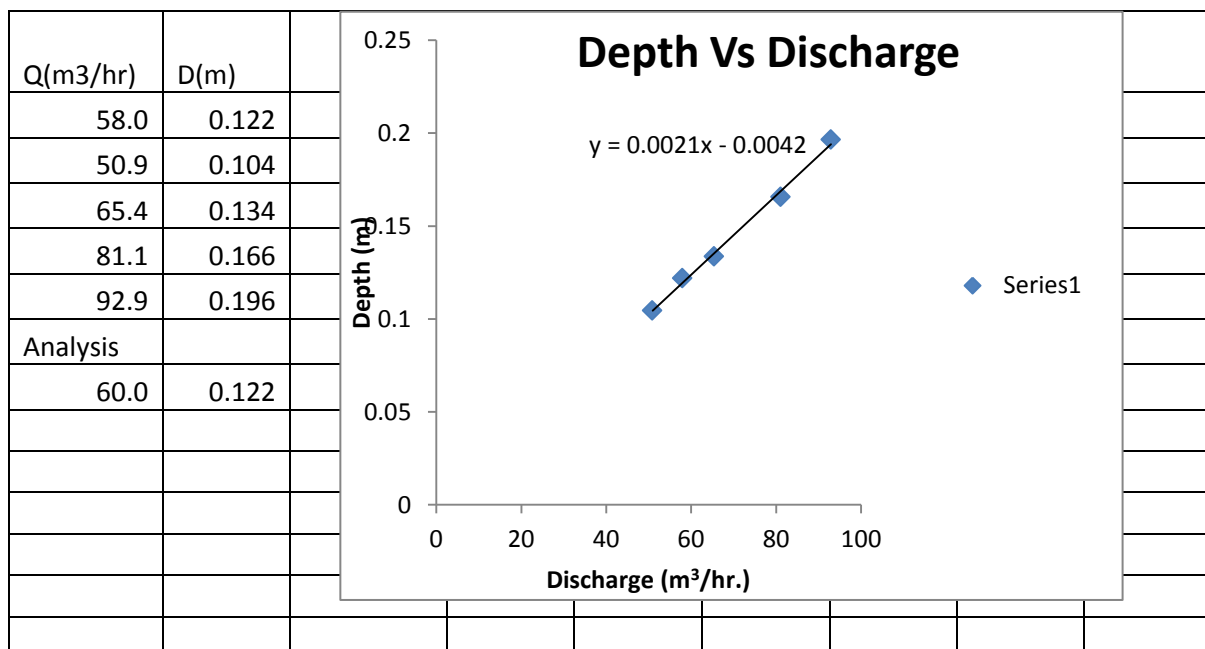


Figure A12. stage-discharge graph for smooth bed flume with vegetation and obstructions

Appendix



Figure A13. Smooth bed flume with a combination of irregularities, obstructions and vegetation.

Table A13. Summary of measured depths on the calibrated stilling pots at the given discharge for the smooth channel with obstruction and irregularities and vegetation.

Distance	Zeros		D1 (Q=41.4)	D2 (Q=52.5)	D3 (Q=63.6)	D4 (Q=66.9)	D5 (Q=69.8)
1.1	61.45	38.55	46.83	79.18	112.5	124.4	131.1
2.2	61.50	38.50	47.31	79.55	112.9	124.8	131.5
3.3	60.30	39.70	48.01	80.37	113.8	125.5	132.2
4.4	59.94	40.06	48.41	80.67	113.9	125.8	132.5
5.5	59.67	40.33	49.24	81.51	114.8	126.7	133.4
6.6	58.74	41.26	49.62	81.94	115.2	127.0	133.7
7.7	58.00	42.00	50.43	82.64	116.0	127.8	134.5
8.8	57.34	42.66	51.04	83.21	116.5	128.2	134.9
9.9	57.07	42.93	51.87	84.19	117.4	129.2	135.9
11	55.60	44.40	52.66	85.00	118.3	130.3	137.0

Appendix

Table A14. Summary of the normalised depth in metres against the stilling pots for smooth flume with obstructions bed after applying procedure for table 4.2

D1e	D2e	D3e	D4e	D5e
0.108	0.118	0.151	0.163	0.193
0.109	0.118	0.151	0.163	0.193
0.108	0.120	0.154	0.165	0.193
0.108	0.121	0.154	0.166	0.193
0.109	0.122	0.155	0.167	0.193
0.108	0.123	0.157	0.168	0.193
0.108	0.125	0.158	0.170	0.193
0.108	0.126	0.159	0.171	0.192
0.109	0.127	0.160	0.172	0.193
0.108	0.129	0.163	0.175	0.193
0.109	0.123	0.156	0.168	0.193

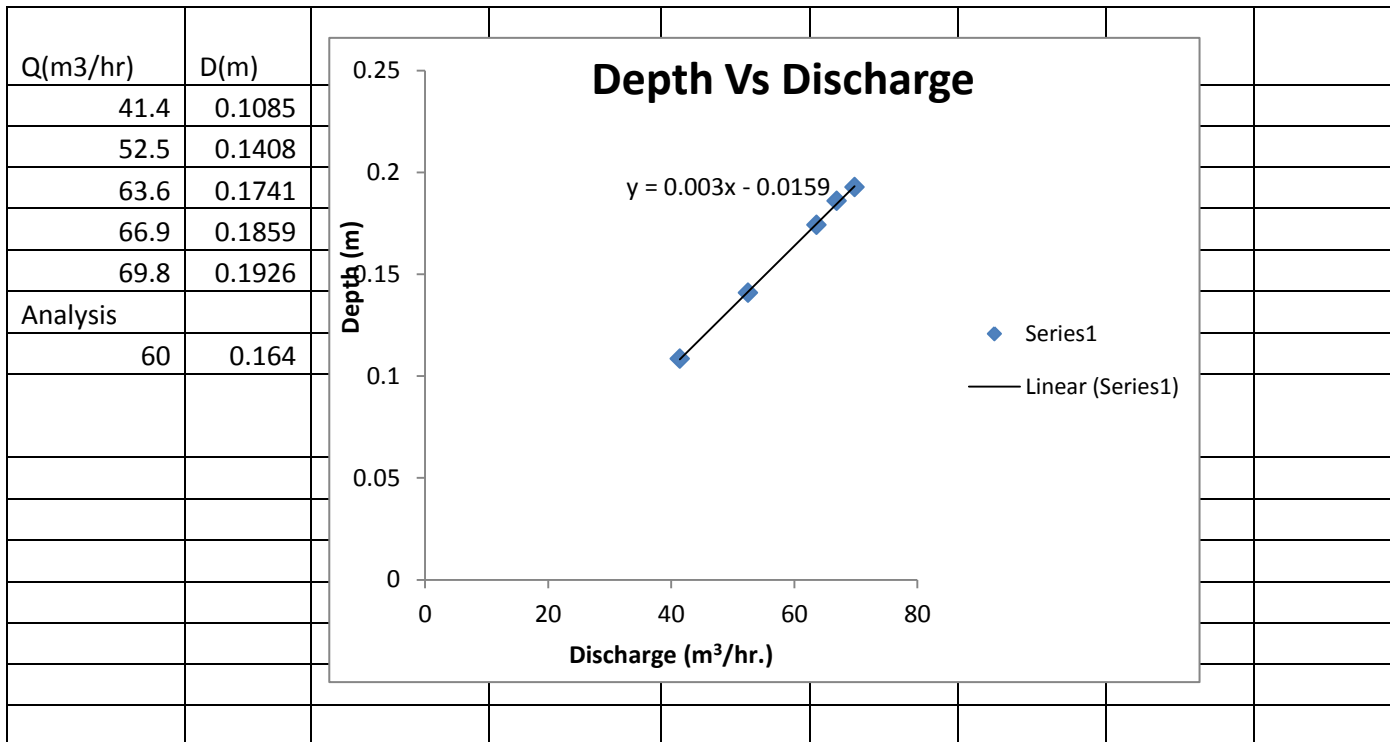


Figure A14. Stage-discharge graph for smooth bed flume with vegetation, irregularities and obstructions.

Appendix

Table A15. Summary of measured depths on the calibrated stilling pots at the given discharge for the rough bed flume only.

Distance	Zeros		D1 (Q=32.6)	D2 (Q=45)	D3 (Q=54.3)	D4 (Q=65.5)	D5(Q=78.8)
1.1	61.45	38.55	19.60	33.01	42.11	51.58	61.86
2.2	61.50	38.50	20.18	33.49	42.68	52.19	62.46
3.3	60.30	39.70	20.84	34.17	43.39	52.83	63.12
4.4	59.94	40.06	21.21	34.59	43.75	53.21	63.51
5.5	59.67	40.33	21.94	35.29	44.50	53.96	64.26
6.6	58.74	41.26	22.51	35.83	45.03	54.47	64.76
7.7	58.00	42.00	23.15	36.44	45.70	55.1	65.41
8.8	57.34	42.66	23.94	37.23	46.44	55.87	66.19
9.9	57.07	42.93	24.80	38.07	47.26	56.75	67.07
11.	55.60	44.40	25.46	38.75	47.74	57.28	67.60

Table A16. Summary of the normalised depth in metres against the stilling pots for smooth flume with obstructions bed after applying procedure for table 4.2

D1e	D2e	D3e	D4e	D5e
0.081	0.095	0.104	0.113	0.123
0.082	0.095	0.104	0.114	0.124
0.081	0.095	0.104	0.113	0.123
0.081	0.095	0.104	0.113	0.124
0.082	0.095	0.104	0.114	0.124
0.081	0.095	0.104	0.113	0.124
0.081	0.094	0.104	0.113	0.123
0.081	0.095	0.104	0.113	0.124
0.082	0.095	0.104	0.114	0.124
0.081	0.094	0.103	0.113	0.123
0.0813	0.0946	0.1038	0.1133	0.1236

Appendix



Figure A15. Rough bed flume with no elements except water.

Q(M ³ /Hr)	D(m)
32.6	0.081
45.0	0.095
54.3	0.1034
65.5	0.113
78.8	0.124
Analysis	
60.0	0.108

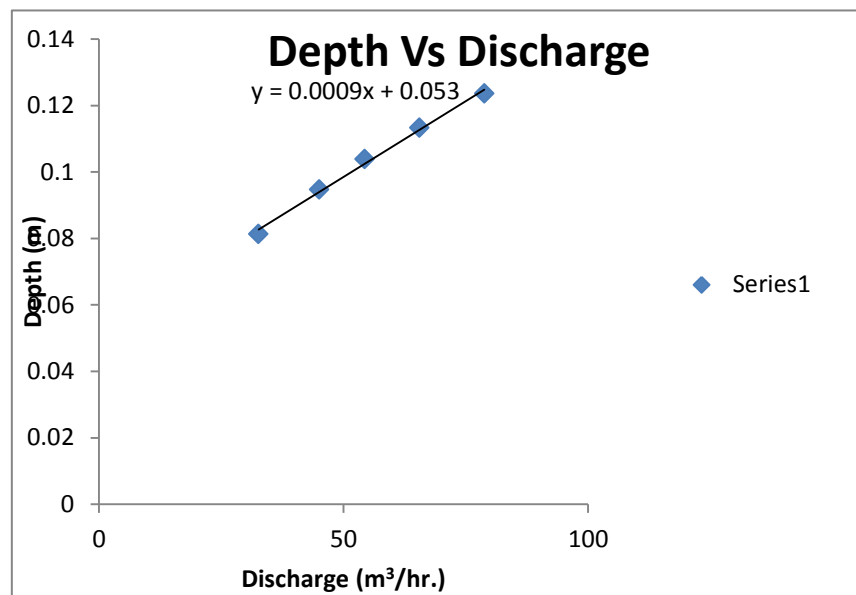


Figure A16. stage-discharge graph for rough bed flume

Appendix



Figure A17. Rough bed flume with irregularities.

Table A17. Summary of measured depths on the calibrated stilling pots at the given discharge for the rough channel with irregularities.

Distance	Zeros		D1 (Q=33.5)	D2 (Q=45)	D3 (Q=57.6)	D4 (Q=68.3)	D5(Q=82.2)
1.1	61.45	38.55	22.77	37.00	51.32	61.42	74.67
2.2	61.50	38.50	23.46	37.70	52.07	61.97	75.30
3.3	60.30	39.70	24.09	38.40	52.74	62.61	76.01
4.4	59.94	40.06	24.46	38.70	53.04	62.97	76.35
5.5	59.67	40.33	25.18	39.40	53.77	63.66	77.05
6.6	58.74	41.26	25.65	39.97	54.25	64.13	77.60
7.7	58.00	42.00	26.36	40.67	54.87	64.78	78.21
8.8	57.34	42.66	27.18	41.53	55.62	65.54	78.94
9.9	57.07	42.93	27.90	41.96	56.26	66.37	79.66
11	55.60	44.40	28.70	42.86	57.31	67.39	80.62

Appendix

Table A18. Summary of the normalised depth in metres against the stilling pots for smooth flume with obstructions bed after applying procedure for table 4.2

D1e	D2e	D3e	D4e	D5e
0.084	0.099	0.113	0.123	0.136
0.085	0.099	0.114	0.124	0.137
0.084	0.099	0.113	0.123	0.136
0.084	0.099	0.113	0.123	0.136
0.085	0.099	0.113	0.123	0.137
0.084	0.099	0.113	0.123	0.136
0.084	0.099	0.113	0.123	0.136
0.084	0.099	0.113	0.123	0.136
0.085	0.099	0.113	0.123	0.136
0.085	0.099	0.113	0.123	0.137
0.084	0.099	0.113	0.123	0.136
0.085	0.099	0.113	0.123	0.136

Continuation of table A27

Re	x	$\frac{l_b}{x}$
38264.94	11.721	0.056
51400.67	10.340	0.064
65792.86	9.461	0.070
78014.79	8.968	0.074
93891.89	8.520	0.077
45689.48	10.843	0.061
57111.85	9.938	0.066
68534.22	9.335	0.071
79956.59	8.904	0.074
93567.25	8.581	0.077
	Ave	0.069

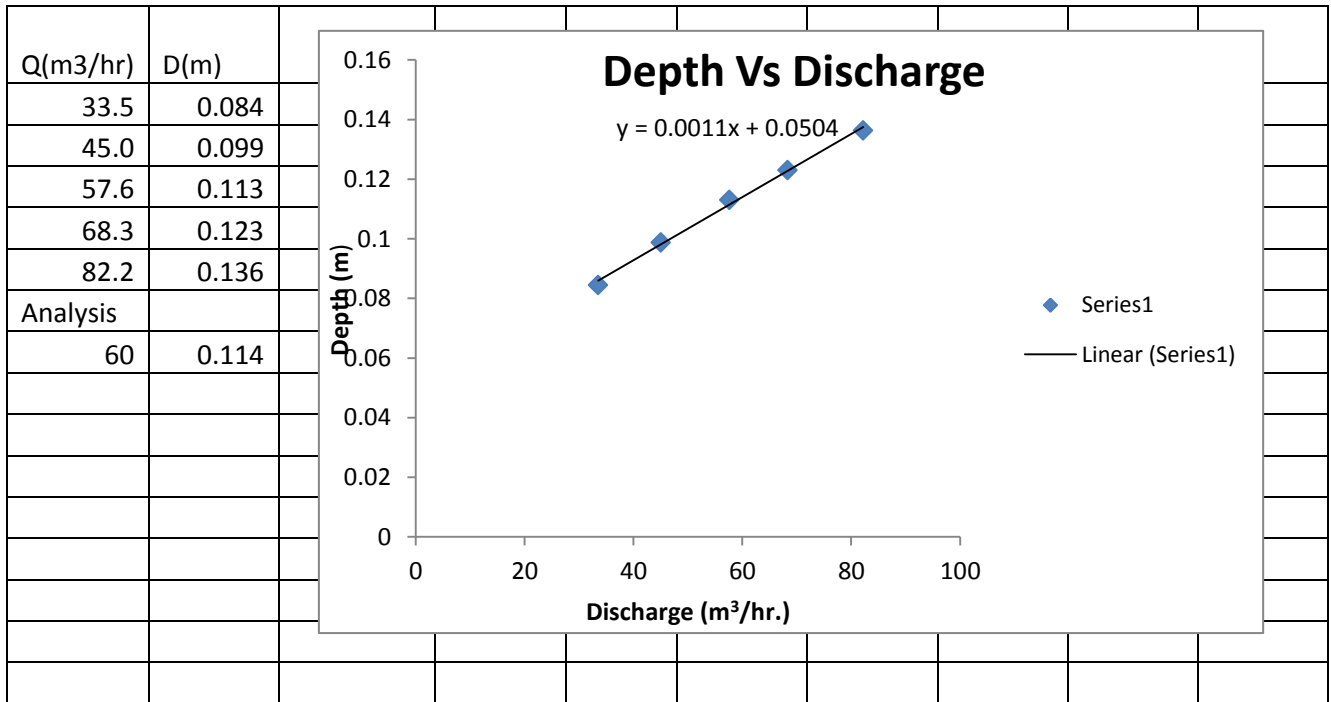


Figure A18. stage-discharge graph for rough bed flume with irregularities.



Figure A19. Rough bed flume with obstructions.

Appendix

Table A19. Summary of measured depths on the calibrated stilling pots at the given discharge for the rough channel with obstructions.

Rough channel with obstruction							
Distance	Zeros		D1 (Q=32.5)	D2 (Q=46.5)	D3 (Q=55.8)	D4 (Q=71.1)	D5 (Q=85.3)
1.1	61.45	38.55	26.82	44.67	58.74	76.07	94.53
2.2	61.50	38.50	27.68	45.53	59.54	76.85	95.41
3.3	60.30	39.70	28.26	46.17	60.19	77.57	96.06
4.4	59.94	40.06	28.72	46.60	60.55	78.00	96.47
5.5	59.67	40.33	29.42	47.42	61.37	78.76	97.28
6.6	58.74	41.26	29.96	47.97	62.00	79.44	97.86
7.7	58.00	42.00	30.63	48.62	62.61	80.03	98.50
8.8	57.34	42.66	31.30	49.30	63.25	80.70	99.15
9.9	57.07	42.93	31.90	49.90	63.90	81.29	99.72
11.	55.60	44.40	32.70	50.57	64.54	81.82	100.4

Table A20. Summary of the normalised depth in metres against the stilling pots for smooth flume with obstructions bed after applying procedure for table 4.2

D1e	D2e	D3e	D4e	D5e
0.088	0.106	0.120	0.138	0.156
0.089	0.107	0.121	0.138	0.157
0.089	0.107	0.121	0.138	0.156
0.089	0.107	0.121	0.138	0.156
0.089	0.107	0.121	0.138	0.157
0.089	0.107	0.121	0.138	0.157
0.089	0.107	0.121	0.138	0.157
0.089	0.107	0.121	0.138	0.157
0.089	0.107	0.121	0.138	0.157
0.088	0.106	0.120	0.137	0.156
0.089	0.107	0.121	0.138	0.157

Appendix

Q(m ³ /hr)	D(m)
32.5	0.089
46.5	0.107
55.8	0.121
71.1	0.138
85.3	0.156
Analysis	
60	0.124

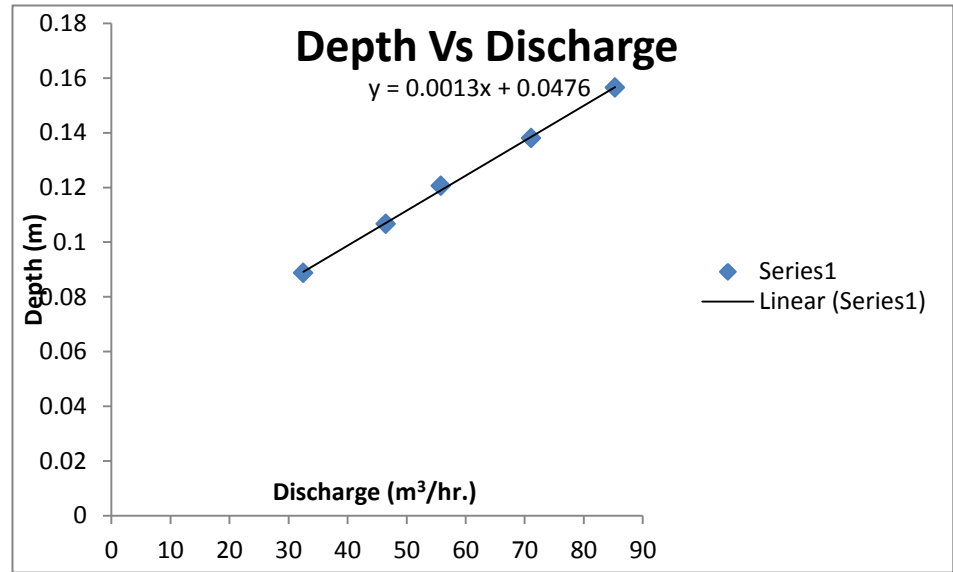


Figure A20. Stage-discharge graph for rough bed flume with obstructions.



Figure A21. Rough bed flume with vegetation.

Appendix

Table A21. Summary of measured depths on the calibrated stilling pots at the given discharge for the rough bed flume with vegetation.

Distance	Zeros		D1 (Q=32.5)	D2 (Q=45)	D3 (Q=56.2)	D4 (Q=65.1)	D5(Q=85)
1.1	61.45	38.55	24.77	38.66	51.82	61.97	75.56
2.2	61.50	38.50	25.43	39.14	52.48	62.62	76.21
3.3	60.30	39.70	26.15	39.99	53.15	63.35	76.83
4.4	59.94	40.06	26.54	40.41	53.52	63.71	77.21
5.5	59.67	40.33	27.19	41.17	54.26	64.43	77.96
6.6	58.74	41.26	27.82	41.57	54.76	64.96	78.34
7.7	58.00	42.00	28.39	42.21	55.31	65.47	78.82
8.8	57.34	42.66	29.09	42.90	56.02	66.17	79.71
9.9	57.07	42.93	29.77	43.68	56.88	67.06	80.66
11	55.60	44.40	30.55	44.68	57.76	67.95	81.65

Table A22. Summary of the normalised depth in metres against the stilling pots for smooth flume with obstructions bed after applying procedure for table 4.2

D1e	D2e	D3e	D4e	D5e
0.086	0.100	0.113	0.123	0.137
0.087	0.101	0.114	0.124	0.138
0.087	0.100	0.114	0.124	0.137
0.087	0.100	0.114	0.124	0.137
0.087	0.101	0.114	0.124	0.138
0.087	0.100	0.114	0.124	0.137
0.086	0.100	0.113	0.124	0.137
0.086	0.100	0.113	0.124	0.137
0.087	0.101	0.114	0.124	0.138
0.086	0.100	0.113	0.124	0.137
0.087	0.100	0.114	0.124	0.137

Appendix

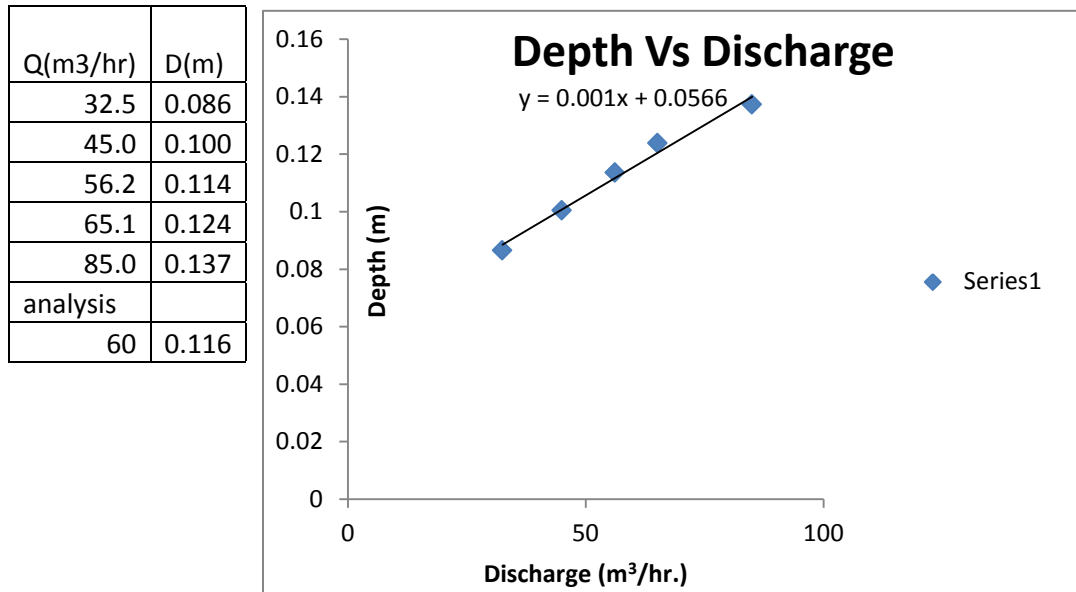


Figure A22. stage-discharge graph for rough bed flume with vegetation.

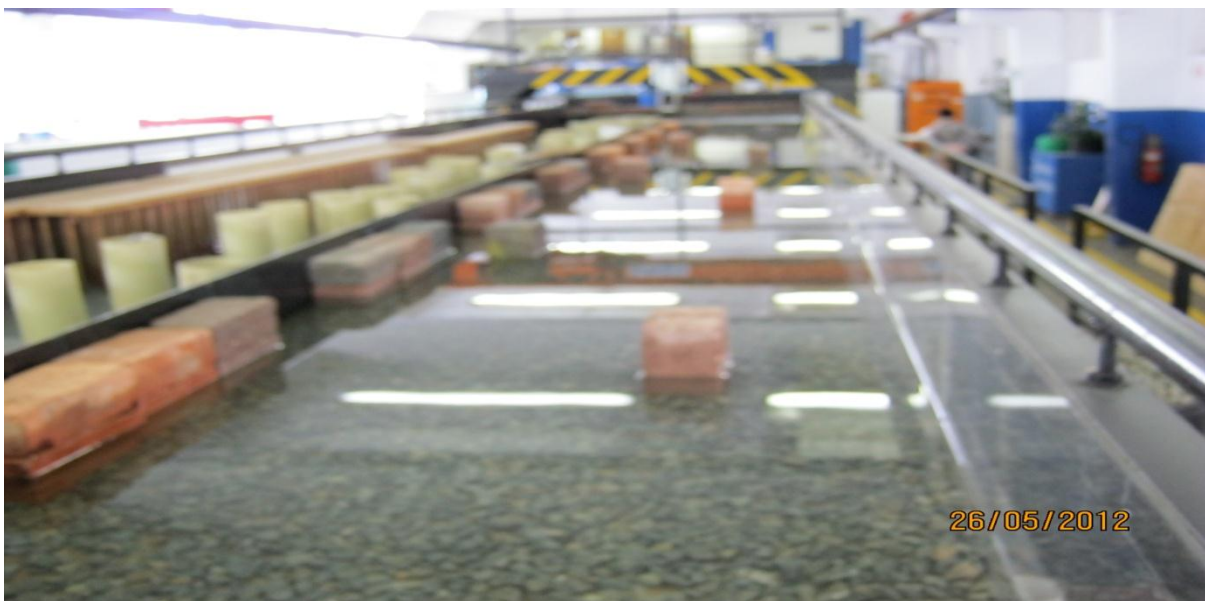


Figure A23. Rough bed flume with irregularities and obstructions.

Appendix

Table A23. Summary of measured depths on the calibrated stilling pots at the given discharge for the rough channel with irregularities and obstructions.

Distance	Zeros		D1 (Q=31.1)	D2 (Q=41.9)	D3 (Q=52.7)	D4 (Q=63.5)	D5 (Q=74.4)
1.1	61.45	38.55	32.98	50.26	69.10	85.78	104.3
2.2	61.50	38.50	33.79	51.01	69.83	86.46	105.0
3.3	60.30	39.70	34.44	51.65	70.44	87.08	105.6
4.4	59.94	40.06	34.81	52.05	70.82	87.46	106.0
5.5	59.67	40.33	35.57	52.76	71.53	88.18	106.8
6.6	58.74	41.26	36.26	53.45	72.26	88.89	107.4
7.7	58.00	42.00	36.81	54.02	72.80	89.42	108.1
8.8	57.34	42.66	37.49	54.67	73.46	90.06	108.7
9.9	57.07	42.93	38.11	55.28	74.10	90.74	109.3
11	55.60	44.40	38.93	56.31	75.06	91.75	110.29

Table A24. Summary of the normalised depth in metres against the stilling pots for smooth flume with obstructions bed after applying procedure for table 4.2

D1e	D2e	D3e	D4e	D5e
0.094	0.112	0.131	0.147	0.166
0.095	0.113	0.131	0.148	0.167
0.095	0.112	0.131	0.147	0.166
0.095	0.112	0.131	0.147	0.166
0.095	0.112	0.131	0.148	0.166
0.095	0.112	0.131	0.148	0.166
0.095	0.112	0.131	0.147	0.166
0.095	0.112	0.131	0.147	0.166
0.095	0.112	0.131	0.148	0.166
0.095	0.112	0.131	0.147	0.166
0.095	0.112	0.131	0.148	0.166

Appendix

Q(m ³ /hr)	D(m)
31.0	0.095
41.9	0.112
52.7	0.131
63.5	0.147
74.4	0.166
Analysis	
60.0	0.142

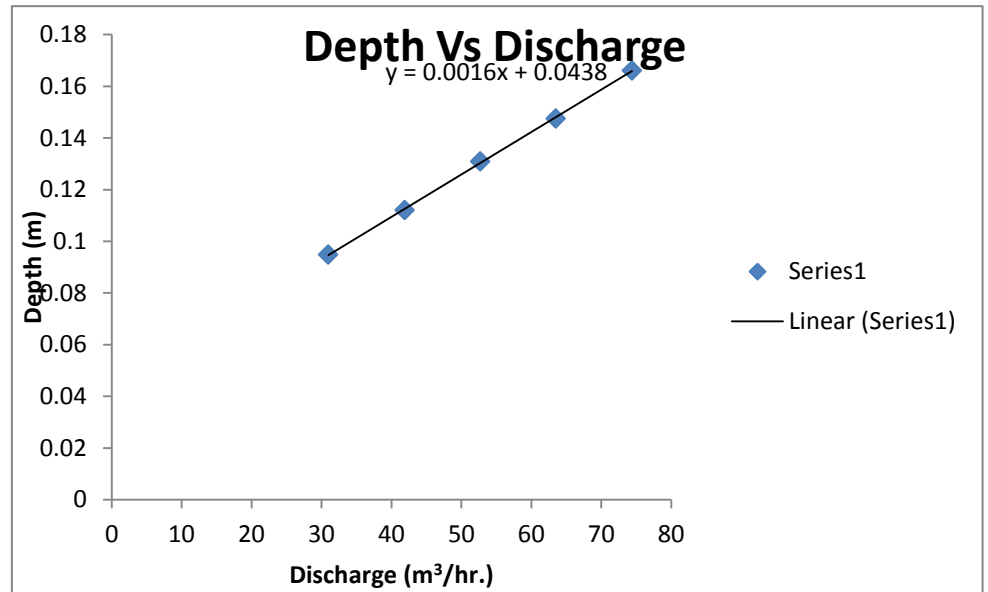


Figure A24. stage-discharge graph for rough bed flume with irregularities and obstructions



Figure A25. Rough bed flume with irregularities and vegetation.

Appendix

Table A25. Summary of measured depths on the calibrated stilling pots at the given discharge for the rough channel with irregularities and vegetation.

Distance	Zeros		D1 (Q=35.7)	D2 (Q=48)	D3 (Q=60.5)	D4 (Q=72.9)	D5(Q=85)
1.1	61.45	38.55	38.30	52.53	69.36	83.98	98.36
2.2	61.50	38.50	38.93	53.15	70.11	84.73	99.02
3.3	60.30	39.70	39.59	53.89	70.82	85.50	99.80
4.4	59.94	40.06	39.83	54.14	70.98	85.67	99.91
5.5	59.67	40.33	40.57	54.93	71.90	86.50	100.8
6.6	58.74	41.26	41.08	55.50	72.32	87.01	101.3
7.7	58.00	42.00	41.56	55.96	72.78	87.44	101.7
8.8	57.34	42.66	42.22	56.62	73.47	88.15	102.5
9.9	57.07	42.93	43.25	57.27	74.28	89.02	103.3
11	55.60	44.40	44.44	58.75	75.61	90.17	104.7

Table A26. Summary of the normalised depth in metres against the stilling pots for smooth flume with obstructions bed after applying procedure for table 4.2

D1e	D2e	D3e	D4e	D5e
0.100	0.114	0.131	0.145	0.160
0.100	0.115	0.132	0.146	0.161
0.100	0.114	0.131	0.146	0.160
0.100	0.114	0.131	0.146	0.160
0.100	0.115	0.132	0.146	0.160
0.100	0.114	0.131	0.146	0.160
0.100	0.114	0.131	0.145	0.160
0.100	0.114	0.131	0.146	0.160
0.100	0.114	0.131	0.146	0.160
0.100	0.114	0.131	0.146	0.160
0.100	0.114	0.131	0.146	0.160
0.100	0.114	0.131	0.146	0.160

Q(m ³ /hr)	D(m)
35.7	0.099
48.0	0.114
60.5	0.131
72.9	0.146
85.0	0.160
Analysis	
60.0	0.130

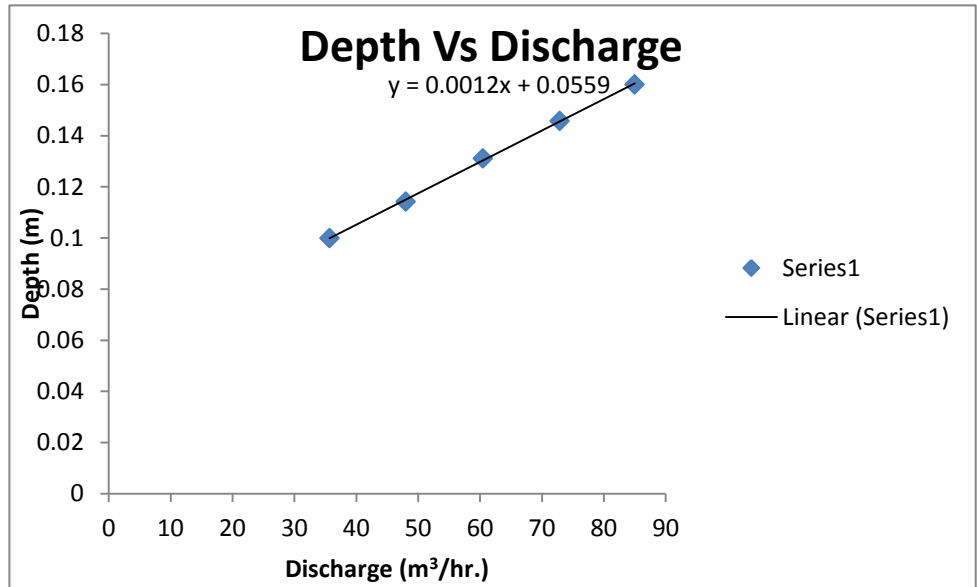


Figure A26. Stage-discharge graph for rough bed flume with irregularities and vegetation.



Figure A27. Rough bed flume with obstruction and vegetation.

Appendix

Table A27. Summary of measured depths on the calibrated stilling pots at the given discharge for the rough channel with obstructions and vegetation

ROUGH CHANNEL WITH VEGETATION AND OBSTRUCTIONS							ROUGH CHANNEL
Distance	Zeros		D1(Q=31)	D2(Q=45)	D3(Q=57.4)	D4(Q=69.8)	D5(Q=82.2)
1.1	61.45	38.55	33.03	52.97	74.61	95.05	116.4
2.2	61.50	38.50	33.74	53.77	75.44	95.78	117.0
3.3	60.30	39.70	34.43	54.45	76.09	96.44	117.8
4.4	59.94	40.06	34.90	54.90	76.54	96.92	118.2
5.5	59.67	40.33	35.59	55.62	77.27	97.66	118.8
6.6	58.74	41.26	36.24	56.26	77.88	98.30	119.6
7.7	58.00	42.00	36.80	56.85	78.45	98.83	120.2
8.8	57.34	42.66	37.52	57.62	79.14	99.59	120.9
9.9	57.07	42.93	38.17	58.14	79.83	100.26	121.5
11	55.60	44.40	38.99	58.73	80.52	100.82	122.1

Table A28. Summary of the normalised depth in metres against the stilling pots for smooth flume with obstructions bed after applying procedure for table 4.2

D1e	D2e	D3e	D4e	D5e
0.095	0.114	0.136	0.157	0.178
0.095	0.115	0.137	0.157	0.179
0.095	0.115	0.136	0.157	0.178
0.095	0.115	0.137	0.157	0.178
0.095	0.115	0.137	0.157	0.179
0.095	0.115	0.137	0.157	0.178
0.095	0.115	0.137	0.157	0.178
0.095	0.115	0.137	0.157	0.178
0.095	0.115	0.137	0.157	0.179
0.095	0.114	0.136	0.156	0.178
0.095	0.115	0.137	0.157	0.178

Appendix

Q(m ³ /hr)	D(m)
31	0.095
45	0.115
57.4	0.136
69.8	0.157
82.2	0.178
Analysis	
60.0	0.142

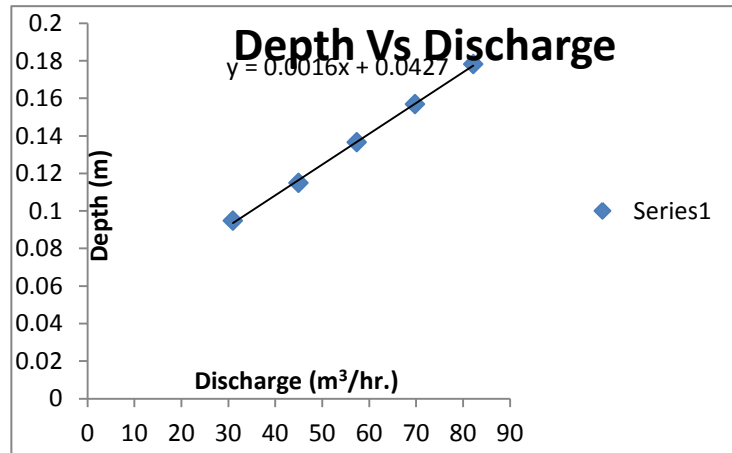


Figure A28. stage-discharge graph for smooth bed flume with vegetation and obstructions



Figure A29. Rough bed flume with a combination of irregularities, obstruction and vegetation.

Appendix

Table A29. Summary of measured depths on the calibrated stilling pots at the given discharge for the rough channel with obstructions, vegetation and irregularities.

Distance	Zeros	(100-zeros)	D1 (Q=27.9)	D2 (Q=37.2)	D3 (Q=45)	D4 (Q=55.7)	D5(Q=71.3)
1.1	61.45	38.55	38.78	60.63	80.66	102.8	130.0
2.2	61.50	38.50	39.58	61.16	81.27	103.3	130.8
3.3	60.30	39.70	40.28	61.82	81.96	104.0	131.6
4.4	59.94	40.06	40.54	62.15	82.22	104.3	131.9
5.5	59.67	40.33	41.34	62.87	83.00	105.0	132.7
6.6	58.74	41.26	41.94	63.45	83.61	105.6	133.3
7.7	58.00	42.00	42.49	63.99	84.21	106.1	133.8
8.8	57.34	42.66	43.27	64.67	84.76	106.8	134.5
9.9	57.07	42.93	43.78	65.60	85.60	107.9	135.0
11	55.60	44.40	44.71	66.55	86.63	108.8	136.1

Table A30. Summary of the normalised depth in metres against the stilling pots for smooth flume with obstructions bed after applying procedure for table 4.2

D1e	D2e	D3e	D4e	D5e
0.100	0.122	0.142	0.164	0.192
0.101	0.123	0.143	0.165	0.192
0.101	0.122	0.142	0.164	0.192
0.101	0.122	0.142	0.164	0.192
0.101	0.123	0.143	0.165	0.192
0.101	0.122	0.142	0.164	0.192
0.101	0.122	0.142	0.164	0.192
0.101	0.122	0.142	0.164	0.192
0.101	0.123	0.143	0.165	0.192
0.100	0.122	0.142	0.164	0.192
0.101	0.122	0.142	0.164	0.192

Appendix

Q(m ³ /hr)	D(m)
27.9	0.101
37.2	0.122
45.0	0.142
55.7	0.164
71.3	0.192
Analysis	
60.0	0.171

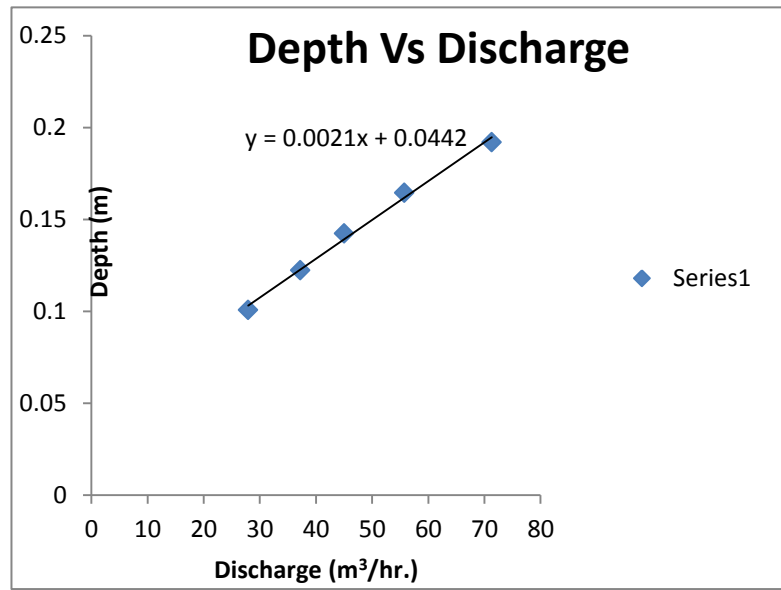


Figure A30. stage-discharge graph for rough bed flume with vegetation, irregularities and obstructions

