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LAMPIRAN

Lampiran 1 Data Hasil Penelitian

Qa1 = 0.001 m^3/s

Qu	P1	P2	ΔP
m^3/s	Paskal	Paskal	Paskal
0.000083	10700	9000	1700
0.000167	11800	10000	1800
0.000250	12900	11000	1900
0.000333	14000	12000	2000
0.000417	17100	15000	2100

Qa2 = 0.00117 m^3/s

Qu	P1	P2	ΔP
m^3/s	Paskal	Paskal	Paskal
0.000083	14200	12000	2200
0.000167	17300	15000	2300
0.000250	18400	16000	2400
0.000333	19500	17000	2500
0.000417	21600	19000	2600

Qa3 = 0.00133 m^3/s

Qu	P1	P2	ΔP
m^3/s	Paskal	Paskal	Paskal
0.000083	17800	15000	2800
0.000167	18900	16000	2900
0.000250	20000	17000	3000
0.000333	21100	18000	3100
0.000417	24200	21000	3200

Qa4 = 0.00150 m^3/s

Qu	P1	P2	ΔP
m^3/s	Paskal	Paskal	Paskal
0.000083	20400	17000	3400
0.000167	21500	18000	3500
0.000250	22600	19000	3600
0.000333	24700	21000	3700
0.000417	26800	23000	3800

Qa5 = 0.00167 m^3/s

Qu	P1	P2	ΔP
m^3/s	Paskal	Paskal	Paskal
0.000083	23000	19000	4000
0.000167	24100	20000	4100
0.000250	26200	22000	4200
0.000333	28300	24000	4300
0.000417	31400	27000	4400

Qa6 = 0.00183 m^3/s

Qu	P1	P2	ΔP
m^3/s	Paskal	Paskal	Paskal
0.000083	26700	22000	4700
0.000167	27800	23000	4800
0.000250	29900	25000	4900
0.000333	32000	27000	5000
0.000417	34100	29000	5100

Qa7 = 0.0020 m^3/s

Qu	P1	P2	ΔP
m^3/s	Paskal	Paskal	Paskal
0.000083	28500	23000	5500
0.000167	29600	24000	5600
0.000250	32700	27000	5700
0.000333	35800	30000	5800
0.000417	38900	33000	5900

Lampiran 2. Data Hasil Perhitungan

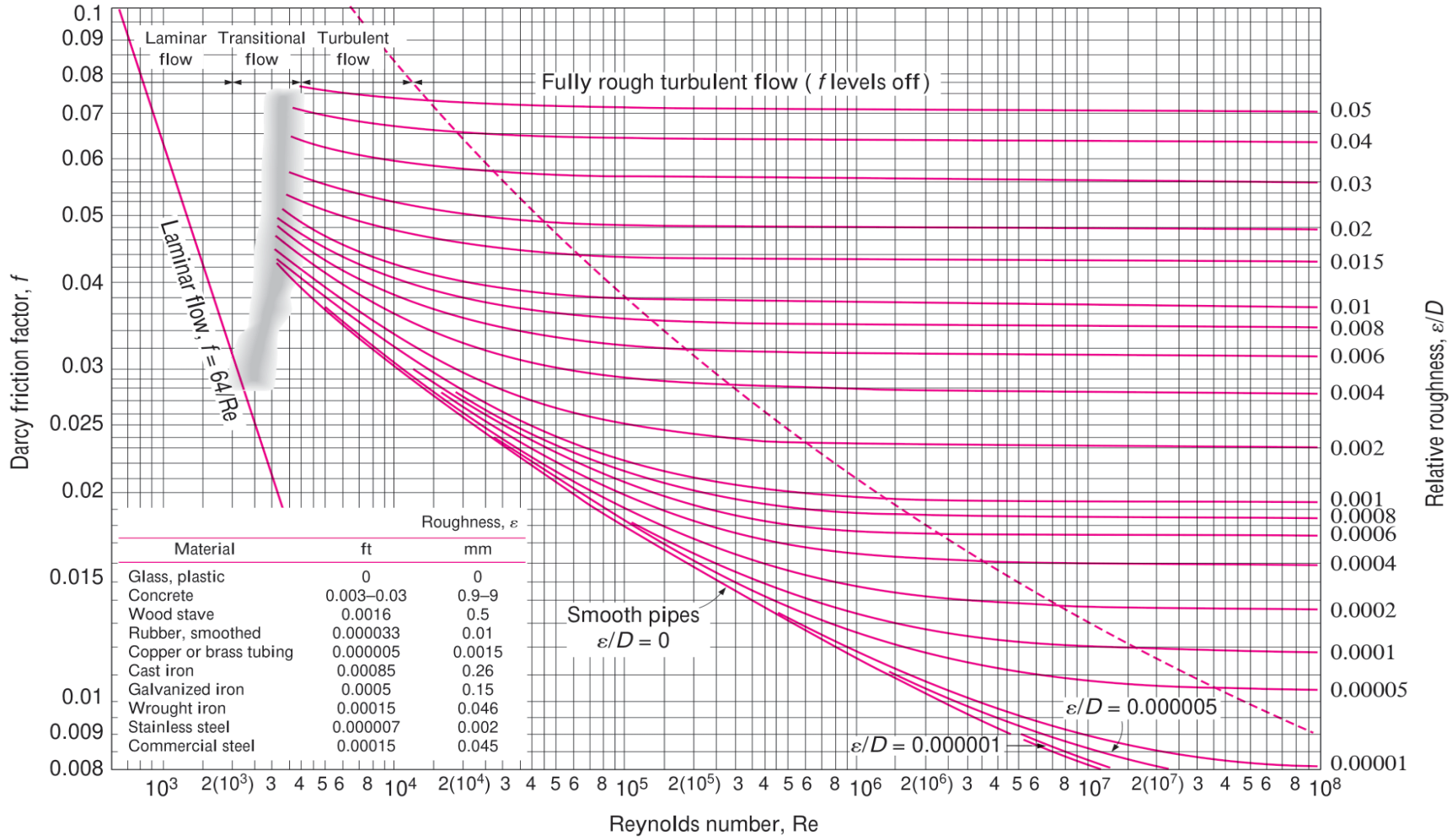
Qa1 = 0.00100 m^3/s				Va = 1.974 m/s			ṁa = 0.997 Kg/s				Ga = 1968.603 Kg/m^2s				
No	Qu	Q *mix*	Vu	V *mix*	ṁu	ṁ *mix*	Gu	G*mix*	x	α	*ρ mix*	μ	Re	f	fteori
	m^3/s	m^3/s	m/s	m/s	Kg/s	Kg/s	Kg/m^2s	Kg/m^2s			Kg/m^3	$N.s/m^2$			
1	0.000083	0.00108	0.165	2.139	0.000099	0.9971	0.195	1968.797	0.000099	0.5	920.399	0.000887	56387.164	0.02051	0.02016
2	0.000167	0.00117	0.329	2.304	0.000197	0.9972	0.390	1968.992	0.000198	0.5	854.741	0.000883	56654.792	0.02016	0.02014
3	0.000250	0.00125	0.494	2.468	0.000296	0.9973	0.584	1969.187	0.000297	0.5	797.837	0.000879	56922.419	0.01986	0.02012
4	0.000333	0.00133	0.658	2.633	0.000395	0.9974	0.779	1969.382	0.000396	0.5	748.046	0.000875	57190.046	0.01960	0.02010
5	0.000417	0.00142	0.823	2.797	0.000493	0.9975	0.974	1969.577	0.000495	0.5	704.113	0.000871	57457.673	0.01936	0.02008
Qa2 = 0.001167 m^3/s				Va = 2.303 m/s			ṁa = 1.163 Kg/s				Ga = 2296.703 Kg/m^2s				
No	Qu	Q *mix*	Vu	V *mix*	ṁu	ṁ *mix*	Gu	G*mix*	x	α	*ρ mix*	μ	Re	f	fteori
	m^3/s	m^3/s	m/s	m/s	Kg/s	Kg/s	Kg/m^2s	Kg/m^2s			Kg/m^3	$N.s/m^2$			
1	0.000083	0.00125	0.165	2.468	0.00010	1.1633	0.195	2296.898	0.000085	0.5	930.612	0.000887	65740.421	0.01971	0.01949
2	0.000167	0.00133	0.329	2.633	0.00020	1.1634	0.390	2297.093	0.000170	0.5	872.523	0.000884	66008.048	0.01932	0.01948
3	0.000250	0.00142	0.494	2.797	0.00030	1.1635	0.584	2297.288	0.000254	0.5	821.268	0.00088	66275.675	0.01897	0.01946
4	0.000333	0.00150	0.658	2.962	0.00039	1.1636	0.779	2297.482	0.000339	0.5	775.708	0.000877	66543.302	0.01866	0.01944
5	0.000417	0.00158	0.823	3.126	0.00049	1.1637	0.974	2297.677	0.000424	0.5	734.943	0.000874	66810.929	0.01839	0.01943
Qa3 = 0.00133 m^3/s				Va = 2.632 m/s			ṁa = 1.329 Kg/s				Ga = 2624.804 Kg/m^2s				
No	Qu	Q *mix*	Vu	V *mix*	ṁu	ṁ *mix*	Gu	G*mix*	x	α	*ρ mix*	μ	Re	f	fteori
	m^3/s	m^3/s	m/s	m/s	Kg/s	Kg/s	Kg/m^2s	Kg/m^2s			Kg/m^3	$N.s/m^2$			
1	0.000083	0.00142	0.165	2.797	0.00010	1.3294	0.195	2624.998	0.000074	0.5	938.423	0.000888	75093.677	0.01937	0.01894
2	0.000167	0.00150	0.329	2.962	0.00020	1.3295	0.390	2625.193	0.000148	0.5	886.354	0.000885	75361.304	0.01895	0.01893
3	0.000250	0.00158	0.494	3.126	0.00030	1.3296	0.584	2625.388	0.000223	0.5	839.766	0.000882	75628.931	0.01857	0.01891
4	0.000333	0.00167	0.658	3.291	0.00039	1.3297	0.779	2625.583	0.000297	0.5	797.837	0.000879	75896.558	0.01823	0.01890
5	0.000417	0.00175	0.823	3.455	0.00049	1.3298	0.974	2625.778	0.000371	0.5	759.901	0.000876	76164.185	0.01792	0.01888

Qa4 = 0.0015 m^3/s			Va = 2.962 m/s			ṁa = 1.496 Kg/s					Ga = 2952.904 Kg/m^2s			
No	Qu	Q *mix*	Vu	V *mix*	ṁu	ṁ *mix*	Gu	G*mix*	x	α	*ρ mix*	μ	Re	f	fteori
	m^3/s	m^3/s	m/s	m/s	Kg/s	Kg/s	Kg/m^2s	Kg/m^2s	ü		Kg/m^3	$N.s/m^2$			
1	0.000083	0.00158	0.165	3.126	0.00010	1.4956	0.195	2953.099	0.000066	0.5	944.589	0.000888	84446.933	0.01871	0.01847
2	0.000167	0.00167	0.329	3.291	0.00020	1.4957	0.390	2953.294	0.000132	0.5	897.418	0.000885	84714.560	0.01829	0.01846
3	0.000250	0.00175	0.494	3.455	0.00030	1.4958	0.584	2953.488	0.000198	0.5	854.741	0.000883	84982.187	0.01792	0.01845
4	0.000333	0.00183	0.658	3.620	0.00039	1.4959	0.779	2953.683	0.000264	0.5	815.943	0.00088	85249.814	0.01758	0.01843
5	0.000417	0.00192	0.823	3.785	0.00049	1.4960	0.974	2953.878	0.000330	0.5	780.518	0.000877	85517.442	0.01727	0.01842
Qa5 = 0.00167 m^3/s			Va = 3.291 m/s			ṁa = 1.66167 Kg/s					Ga = 3281.004 Kg/m^2s			
No	Qu	Q *mix*	Vu	V *mix*	ṁu	ṁ *mix*	Gu	G*mix*	x	α	*ρ mix*	μ	Re	f	fteori
	m^3/s	m^3/s	m/s	m/s	Kg/s	Kg/s	Kg/m^2s	Kg/m^2s	ü		Kg/m^3	$N.s/m^2$			
1	0.000083	0.00175	0.165	3.455	0.00010	1.6618	0.195	3281.199	0.000059	0.5	949.580	0.000889	93800.189	0.01792	0.01807
2	0.000167	0.00183	0.329	3.620	0.00020	1.6619	0.390	3281.394	0.000119	0.5	906.471	0.000886	94067.816	0.01753	0.01805
3	0.000250	0.00192	0.494	3.785	0.00030	1.6620	0.584	3281.589	0.000178	0.5	867.111	0.000884	94335.443	0.01718	0.01804
4	0.000333	0.00200	0.658	3.949	0.00039	1.6621	0.779	3281.784	0.000237	0.5	831.031	0.000881	94603.071	0.01686	0.01803
5	0.000417	0.00208	0.823	4.114	0.00049	1.6622	0.974	3281.979	0.000297	0.5	797.837	0.000879	94870.698	0.01656	0.01802
Qa6 = 0.00183 m^3/s			Va = 3.620 m/s			ṁa = 1.828 Kg/s					Ga = 3609.105 Kg/m^2s			
No	Qu	Q *mix*	Vu	V *mix*	ṁu	ṁ *mix*	Gu	G*mix*	x	α	*ρ mix*	μ	Re	f	fteori
	m^3/s	m^3/s	m/s	m/s	Kg/s	Kg/s	Kg/m^2s	Kg/m^2s	ü		Kg/m^3	$N.s/m^2$			
1	0.000083	0.00192	0.165	3.785	0.00010	1.8279	0.195	3609.300	0.000054	0.5	953.704	0.000889	103153.445	0.01748	0.01771
2	0.000167	0.00200	0.329	3.949	0.00020	1.8280	0.390	3609.495	0.000108	0.5	914.015	0.000886	103421.073	0.01711	0.01770
3	0.000250	0.00208	0.494	4.114	0.00030	1.8281	0.584	3609.689	0.000162	0.5	877.502	0.000884	103688.700	0.01676	0.01769
4	0.000333	0.00217	0.658	4.278	0.00039	1.8282	0.779	3609.884	0.000216	0.5	843.798	0.000882	103956.327	0.01645	0.01768
5	0.000417	0.00225	0.823	4.443	0.00049	1.8283	0.974	3610.079	0.000270	0.5	812.590	0.00088	104223.954	0.01615	0.01767

Qa7 = 0.002 m^3/s Va = 3.949 m/s ṁa = 1.994 Kg/s Ga = 3937.205 Kg/m^2s

No	Qa	Q *mix*	Vu	V *mix*	ṁu	ṁ *mix*	Gu	G *mix*	x	α	*ρ mix*	μ	Re	f	fteori
	m^3/s	m^3/s	m/s	m/s	Kg/s	Kg/s	Kg/m^2s	Kg/m^2s			Kg/m^3	$N.s/m^2$			
1	0.000083	0.00208	0.165	4.114	0.00010	1.9941	0.195	3937.400	0.000049	0.5	957.167	0.000889	112506.702	0.01725	0.01739
2	0.000167	0.00217	0.329	4.278	0.00020	1.9942	0.390	3937.595	0.000099	0.5	920.399	0.000887	112774.329	0.01689	0.01739
3	0.000250	0.00225	0.494	4.443	0.00030	1.9943	0.584	3937.790	0.000148	0.5	886.354	0.000885	113041.956	0.01655	0.01738
4	0.000333	0.00233	0.658	4.607	0.00039	1.9944	0.779	3937.985	0.000198	0.5	854.741	0.000883	113309.583	0.01624	0.01737
5	0.000417	0.00242	0.823	4.772	0.00049	1.9945	0.974	3938.179	0.000247	0.5	825.308	0.000881	113577.210	0.01595	0.01736

Lampiran 3. Diagram Moody



Roughness, ε		
Material	ft	mm
Glass, plastic	0	0
Concrete	0.003–0.03	0.9–9
Wood stave	0.0016	0.5
Rubber, smoothed	0.000033	0.01
Copper or brass tubing	0.000005	0.0015
Cast iron	0.00085	0.26
Galvanized iron	0.0005	0.15
Wrought iron	0.00015	0.046
Stainless steel	0.000007	0.002
Commercial steel	0.00015	0.045