

List Data Peserta Kuliah Hidraulika Saluran Terbuka dari SIMASTER UGM

No	NIU	Nama	Program Studi	Angkatan	Periode Angkatan	Kurikulum	Status	Modifikasi
1	385723	DANIEL KUSUMA DEWA	S1 TEKNIK SIPIL	2015	2015	Kurikulum 2016	AKTIF	2015: Daniel Kusuma Dewa (385723)
2	395312	ALIKA WIDY HANDARNI	S1 TEKNIK SIPIL	2016	2016	Kurikulum 2016	AKTIF	2016: Alike Widy Handarni (395312)
3	395313	ALMIRA ROSIYANA	S1 TEKNIK SIPIL	2016	2016	Kurikulum 2016	AKTIF	2016: Almira Rosiyana (395313)
4	395364	REZA ADITYA PRATAMA	S1 TEKNIK SIPIL	2016	2016	Kurikulum 2016	AKTIF	2016: Reza Aditya Pratama (395364)
5	395371	SRI NURFATIMAH	S1 TEKNIK SIPIL	2016	2016	Kurikulum 2016	AKTIF	2016: Sri Nurfatimah (395371)
6	395373	ANASTASYIA TRIYUNI A	S1 TEKNIK SIPIL	2016	2016	Kurikulum 2016	AKTIF	2016: Anastasyia Triyuni A (395373)
7	400268	AINUN ANGGITAMUKTI	S1 TEKNIK SIPIL	2016	2016	Kurikulum 2016	AKTIF	2016: Ainun Anggitamukti (400268)
8	400271	ANDI NURSASONGKO	S1 TEKNIK SIPIL	2016	2016	Kurikulum 2016	AKTIF	2016: Andi Nursasongko (400271)
9	400283	ENRICO ABI	S1 TEKNIK SIPIL	2016	2016	Kurikulum 2016	AKTIF	2016: Enrico Abi (400283)
10	400313	NASWAHATIN MAHARANI	S1 TEKNIK SIPIL	2016	2016	Kurikulum 2016	AKTIF	2016: Naswahatin Maharani (400313)
11	405735	TAHTA PERJUANGAN P R	S1 TEKNIK SIPIL	2016	2016	Kurikulum 2016	AKTIF	2016: Tahta Perjuangan P R (405735)
12	410430	GALUH KHOLIFA JATI	S1 TEKNIK SIPIL	2017	2017	Kurikulum 2016	AKTIF	2017: Galuh Kholifa Jati (410430)
13	415209	ANGGA VERIAN PERMANA	S1 TEKNIK SIPIL	2017	2017	Kurikulum 2016	AKTIF	2017: Angga Verian Permana (415209)
14	425249	AGATHA SINTA N P	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Agatha Sinta N P (425249)
15	425252	ANDREA ANINDYANARI W	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Andrea Anindyanari W (425252)
16	425255	ARRYWWA HAFIDZ N	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Arrywwa Hafidz N (425255)
17	425258	BAGAS PRANOWO JATI	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Bagas Pranowo Jati (425258)
18	425261	DIKKY DWI HERMANDA	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Dikky Dwi Hermanda (425261)
19	425264	EDWIN	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Edwin (425264)
20	425270	IDAM SETIADI	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Idam Setiadi (425270)
21	425276	MARIA ASKENS VANIA	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Maria Askensi Vania (425276)
22	425279	MUHAMMAD HANIFAN	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Muhammad Hanifan (425279)
23	425282	NIKEN PRAMUDITA K	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Niken Pramudita K (425282)
24	425283	NUR ANNISA FATHIN F	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Nur Annisa Fathin F (425283)
25	425285	RIDHWAN AFNAN P	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Ridhwan Afnan P (425285)
26	425288	SALMA PUTRI AFIDA	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Salma Putri Afida (425288)
27	425291	YANDILA WIJAYANTI	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Yandila Wijayanti (425291)
28	428988	ALFIAN AUFA VALERIAN	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Alfian Aufa Valerian (428988)
29	428994	ARDIANUS IMANUEL Z	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Ardianus Imanuel Z (428994)
30	428997	DICKY SURYANTO	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Dicky Suryanto (428997)
31	429000	FADEL DAMARJATI	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Fadel Damarjati (429000)
32	429003	FAUZAN YUDHISTIRA H	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Fauzan Yudhistira H (429003)
33	429004	GERALDO BENEDICT T S	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Geraldo Benedict T S (429004)
34	429006	HAYFA AMIRAH M	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Hayfa Amirah M (429006)
35	429009	JIMMY LAU	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Jimmy Lau (429009)
36	429012	M FIKRI ANANDA H	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: M Fikri Ananda H (429012)
37	429015	M. MIRZAN AZIZ	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: M. Mirzan Aziz (429015)
38	429019	MUHAMMAD ABDUL G A	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Muhammad Abdul G A (429019)
39	429024	NANDHITA N P D	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Nandhita N P D (429024)
40	429027	NIZAR AMIR MUSAFFA	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Nizar Amir Musaffa (429027)
41	429039	SHAF A BASYUNA A	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Shafa Basyuna A (429039)
42	429042	SYAFIRA BUNGA A	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Syafira Bunga A (429042)
43	429045	THOMAS GOLDY	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Thomas Goldy (429045)
44	431335	ADRIEL TIO	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Adriel Tio (431335)
45	431338	ALOYSIUS CHRISTIAN H	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Aloysius Christian H (431338)
46	431341	BULAN AURA D	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Bulan Aura D (431341)
47	431347	ELVIRA APRIANA	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Elvira Apriana (431347)
48	431350	FIKRI RIZAL MA RUF	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Fikri Rizal Ma Ruf (431350)
49	431356	JASON ONG	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Jason Ong (431356)
50	431359	MELLIN SALSABILLA W	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Mellin Salsabilla W (431359)
51	431362	MUH YUKA DWI ANANTA	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Muh Yuka Dwi Ananta (431362)
52	431365	MUHAMMAD RAFLY SUHRI	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Muhammad Rafly Suhri (431365)
53	431368	ONDOLAN NATHAN	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Ondolan Nathan (431368)
54	431371	RANA SATRIA WINATA	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Rana Satria Winata (431371)
55	431372	REINHARD	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Reinhard (431372)
56	431374	RIDHA ULFATY	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Ridha Ulfaty (431374)
57	431377	SETIAWAN NUGROHO	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Setiawan Nugroho (431377)
58	431378	SYAVIRA INDAH UTAMI	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Syavira Indah Utami (431378)
59	431380	WAHYU MULYANA PUNGKI	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Wahyu Mulyana Pungki (431380)
60	432353	ARYANDHI JEANVICK BUDIMAN	S1 TEKNIK SIPIL	2018	2018	Kurikulum 2016	AKTIF	2018: Aryandhi Jeanvick Budiman (432353)

Modul 4A: Data Loncat Air di Pintu Air Untuk Latihan & Evaluasi Mahasiswa Peserta Hidraulika Saluran Terbuka Kelas B

Loncat Air Bebas

$$\phi = \frac{h_2}{h_1} = \frac{1}{2} \left(\sqrt{1 + 8Fr_1^2} - 1 \right) \dots \text{(I)}$$

$$Fr = \frac{V}{\sqrt{g \frac{A \cos \theta}{B \beta}}} \rightarrow Fr^2 = \frac{\beta V^2}{g \frac{A \cos \theta}{B}}$$

dengan *h* adalah kedalaman air diukur vertikal

dengan *d* adalah kedalaman air diukur tegak lurus dasar

Umum:
$$h_{kritik} : \frac{A^3}{W} = \frac{\alpha Q^2}{g}$$

Persegi:
$$h_{kritik} : h_{kritik}^3 = \frac{\alpha Q^2}{gB^2} \rightarrow h_{kritik} = \sqrt[3]{\frac{\alpha Q^2}{gB^2}}$$

Loncat Air Terendam

Govinda Rao (1963)

$$\frac{h_3}{h_1} = \sqrt{(1+S)^2 \phi^2 - 2Fr_1^2} + \frac{2Fr_1^2}{(1+S)\phi} \dots \text{(II)}$$

$$S = \frac{h_4 - h_2}{h_2}$$

$$L_{lat} = (4,9S + 6,1)h_2$$

Ven Te Chow (1959)

$$\frac{h_3}{h_4} = \sqrt{1 + 2Fr_4^2 \left(1 - \frac{h_4}{h_1}\right)} \dots \text{(III)}$$

Loncat Air Bebas Dasar Saluran Datar

1. Kehilangan tenaga:
$$\Delta E_{la} = E_1 - E_2 = \left(h_1 + \frac{\alpha V_1^2}{2g} \right) - \left(h_2 + \frac{\alpha V_2^2}{2g} \right)$$

2. Efisiensi:
$$e_{la} = \frac{E_2}{E_1}$$

3. Tinggi:
$$h_{la} = h_2 - h_1$$

4. Panjang Loncat Air L_{la} :

4a. KazimierzWóycicki (1931):
$$L_{la} = \left(8 - 0,05 \frac{h_2}{h_1} \right) (h_2 - h_1)$$

4b. Jan Smetana (1933) :
$$L_{la} = 6(h_2 - h_1)$$

4c. Silvester (1964):
$$L_{la} = 9,75h_1 (Fr_1 - 1)^{1,01}$$

Koefisien koreksi $\alpha = 1,02$				Koefisien koreksi $\beta = 1,05$														Percepatan gravitasi, g = 9,80 m/d ²											
Mahasiswa Peserta Kelas B				Data Pintu Air				KB Hilir	Hitungan h_{kr}	Kontraksi Max.	Hitungan Loncat air: (1) terendam, (2) bebas/semipurna tepat di depan pintu, dan (3) bebas di hilir pintu mengikuti kurva H3-LA-H2														Panjang Loncat Air				
				Q (m ³ /d)	B (m)	Bukaan Pintu (m)	Koef. Kontraksi	Dalam Air (m)	h kritik (m)	h LA hulu (m)	Hitungan parameter loncat air						Jenis Loncat Air				Karakteristika Loncat Air				Terendam	Bebas/H3-LA-H2			
No	Angkatan	NIU	Nama	Q	B	d_1	C_v	h_z	h_{kr}	h_1	Fr_1	ϕ	h_2	Fr_2	Fr_4	E_{hilir}	S	Jenis	Simbol	h_{hulu} (m)	Fr_{hulu}	E_{hulu}	ΔE	Eff	h_{la}	Govinda	Sivester	Smetana	Woycicki
1	2015	385723	Daniel Kusuma Dewa	12,80	1,70	1,204	0,70	4,4570	1,8070	0,8428	3,1853	4,0324	3,3985	0,3934	0,2619	4,6055	0,3115	Terendam	h3 =	2,8594	0,5097	3,2203	-1,3853	143,02%	1,5976	25,9175	18,0985	15,3343	19,9305
2	2016	395312	Alika Widy Handarni	15,00	2,41	1,061	0,57	2,3340	1,5916	0,6048	4,3318	5,6465	3,4148	0,3229	0,5714	2,7041	-0,3165	H3-LA-H2	h1 =	1,0508	1,8914	2,8767	0,1726	94,00%	1,2832	15,5344	9,1223	16,8603	10,1233
3	2016	395313	Almira Rosiyana	15,20	1,46	0,747	0,56	5,0830	2,2428	0,4183	12,5953	17,3195	7,2451	0,1747	0,2974	5,3013	-0,2984	H3-LA-H2	h1 =	0,7794	4,9523	10,0642	4,7629	52,67%	4,3036	33,6008	30,4509	40,9606	33,0253
4	2016	395364	Reza Aditya Pratama	18,20	1,18	0,971	0,62	10,6860	2,9146	0,6020	10,8082	14,7933	8,9059	0,1900	0,1445	10,7944	0,1999	Terendam	h3 =	5,8553	0,3563	6,2164	-4,5780	173,64%	4,8307	63,0485	58,9009	49,8231	60,2888
5	2016	395371	Sri Nurfatimah	17,70	2,30	0,611	0,60	5,7032	1,8335	0,3666	11,3485	15,5570	5,7032	0,1849	0,1849	5,7979	0,0000	Bebas	h1 =	0,3666	11,3485	23,2990	17,5011	24,88%	5,3366	34,7895	37,8637	32,0195	38,5417
6	2016	395373	Anastasyia Triyuni A	13,50	1,35	0,727	0,60	5,8220	2,1834	0,4362	11,3620	15,5760	6,7943	0,1848	0,2330	5,9755	-0,1431	H3-LA-H2	h1 =	0,5753	7,5006	16,2971	10,3215	36,67%	5,2467	36,6809	37,1546	38,1483	39,3187
7	2016	400268	Ainun Anggitamukti	14,00	1,52	0,688	0,64	5,9250	2,0669	0,4403	10,3184	14,1010	6,2090	0,1949	0,2090	6,0508	-0,0457	H3-LA-H2	h1 =	0,4791	9,0916	19,7136	13,6628	30,69%	5,4459	36,4833	38,5955	34,6118	40,1997
8	2016	400271	Andi Nursasongko	7,00	0,90	0,615	0,68	5,3623	1,8466	0,4182	9,4137	12,8224	5,3623	0,2050	0,2050	5,4718	0,0000	Bebas	h1 =	0,4182	9,4137	18,4188	12,9470	29,71%	4,9441	32,7102	35,0450	29,6647	36,3832
9	2016	400283	Enrico Abi	9,50	1,23	0,612	0,67	5,3822	1,8380	0,4100	9,6285	13,1260	5,3822	0,2025	0,2025	5,4894	0,0000	Bebas	h1 =	0,4100	9,6285	18,8742	13,3848	29,08%	4,9721	32,8313	35,2475	29,8329	36,5139
10	2016	400313	Naswahatin Maharani	14,90	1,88	1,246	0,68	3,5846	1,8699	0,8473	3,3264	4,2307	3,5846	0,3823	0,3823	3,8390	0,0000	Bebas	h1 =	0,8473	3,3264	5,4008	1,5618	71,08%	2,7373	21,8659	19,3810	16,4238	21,3193
11	2016	405735	Tahta Perjuangan P R	14,90	1,02	0,936	0,55	7,4950	2,8109	0,5148	12,9452	17,8142	9,1707	0,1722	0,2330	7,6927	-0,1827	H3-LA-H2	h1 =	0,7408	7,4995	20,9774	13,2847	36,67%	6,7542	47,7304	47,8305	51,9356	50,6169
12	2017	410430	Galuh Kholifa Jati	16,60	0,76	2,450	0,57	7,8862	3,6755	1,3965	4,3323	5,6471	7,8862	0,3228	0,3228	8,2854	0,0000	Bebas	h1 =	1,3965	4,3323	14,1272	5,8418	58,65%	6,4897	48,1058	45,9211	38,9382	50,0851
13	2017	415209	Angga Verian Permana	19,10	2,18	0,666	0,56	6,4573	1,9991	0,3730	12,5911	17,3136	6,4573	0,1748	0,1748	6,5531	0,0000	Bebas	h1 =	0,3730	12,5911	29,0922	22,5391	22,53%	6,0843	39,3894	43,1951	36,5059	43,4074
14	2018	425249	Agatha Sinta N P	9,70	2,60	0,377	0,65	4,5260	1,1315	0,2451	10,0670	13,7456	3,3684	0,1975	0,1268	4,5614	0,3437	Terendam	h3 =	2,9954	0,2356	3,0761	-1,4852	148,28%	1,5306	26,2194	22,1460	18,7398	22,8399
15	2018	425252	Andrea Anindyanari W	20,10	2,01	0,727	0,55	7,2770	2,1834	0,3999	12,9460	17,8153	7,1234	0,1722	0,1667	7,3753	0,0216	Terendam	h3 =	1,5192	1,7481	3,7741	-3,6012	195,42%	5,7578	44,2054	47,7416	40,3415	47,7995
16	2018	425255	Arrywwa Hafidz N	5,70	2,56	0,267	0,66	2,3688	0,8021	0,1762	9,8522	13,4421	2,3688	0,1999	0,1999	2,4147	0,0000	Bebas	h1 =	0,1762	9,8522	8,4844	6,0696	28,46%	2,1925	14,4495	15,5447	13,1553	16,0668
17	2018	425258	Bagas Pranowo Jati	10,20	1,70	1,035	0,59	2,0700	1,5532	0,6107	4,1157	5,3419	3,2620	0,3333	0,6594	2,5072	-0,3654	H3-LA-H2	h1 =	1,1554	1,5813	2,5588	0,0515	97,99%	0,9146	14,0575	6,5135	15,9084	7,2347
18	2018	425261	Dikky Dwi Hermanda	3,00	2,42	0,180	0,58	0,8320	0,5428	0,1044	12,0292	16,5192	1,7246	0,1792	0,5347	0,9475	-0,5176	H3-LA-H2	h1 =	0,3382	2,0629	1,0373	0,0898	91,34%	0,4938	6,1463	3,5072	9,7212	3,8894
19	2018	425264	Edwin	2,70	1,86	0,201	0,70	1,7225	0,6031	0,1407	9,0031	12,2421	1,7225	0,2102	0,2102	1,7594	0,0000	Bebas	h1 =	0,1407	9,0031	5,6800	3,9206	30,98%	1,5818	10,5070	11,2096	9,4906	11,6859
20	2018	425270	Idam Setiadi	5,80	1,32	0,420	0,70	2,0190	1,2619	0,2940	9,0222	12,2692	3,6071	0,2099	0,5013	2,2655	-0,4403	H3-LA-H2	h1 =	0,7421	2,2497	2,5664	0,3009	88,27%	1,2769	14,2217	9,0624	19,8788	10,0413
21	2018	425276	Maria Askensi Vania	11,60	2,43	0,444	0,66	2,5780	1,3336	0,2930	9,8502	13,4392	3,9382	0,1999	0,3775	2,7564	-0,3454	H3-LA-H2	h1 =	0,5966	3,3904	3,9279	1,1715	70,18%	1,9814	17,3581	14,0277	21,8711	15,4228
22	2018	425279	Muhammad Hanifan	16,90	1,56	0,767	0,69	6,1410	2,3030	0,5292	9,2104	12,5350	6,6339	0,2075	0,2330	6,3030	-0,0743	H3-LA-H2	h1 =	0,6069	7,5003	17,1893	10,8863	36,67%	5,5341	38,0516	39,1902	36,6281	41,4730
23	2018	425282	Niken Pramudita K	20,30	1,03	2,288	0,58	6,1770	3,4321	1,3270	4,2200	5,4889	7,2840	0,3282	0,4202	6,7068	-0,1520	H3-LA-H2	h1 =	1,7088	2,8881	8,6316	1,9249	77,70%	4,4682	39,0081	31,6571	35,7418	34,9381
24	2018	425283	Nur Annisa Fathin F	12,80	2,22	0,504	0,65	4,5023	1,5125	0,3276	10,0652	13,7431	4,5023	0,1976	0,1976	4,5876	0,0000	Bebas	h1 =	0,3276	10,0652	16,4478	11,8602	27,89%	4,1747	27,4637	29,6006	25,0479	30,5286
25	2018	425285	Ridhwan Afnan P	3,70	2,33	0,213	0,58	2,0305	0,6403	0,1235	11,9706	16,4364	2,0305	0,1796	0,1796	2,0624	0,0000	Bebas	h1 =	0,1235	11,9706	8,7220	6,6596	23,65%	1,9070	12,3864	13,5346	11,4421	13,6889
26	2018	425288	Salma Putri Afida	3,70	1,61	0,546	0,70	1,6920	0,8192	0,3822	3,1836	4,0300	1,5403	0,3935	0,3418	1,7880	0,0985	Terendam	h3 =	0,7554	1,1458	1,2371	-0,5509	144,54%	0,9366	10,1391	8,2010	6,9484	9,0312
27	2018	425291	Yandila Wijayanti	8,40	1,06	0,623	0,61	5,3590	1,8697	0,3800	11,0721	15,1662	5,7636	0,1875	0,2091	5,4728	-0,0702	H3-LA-H2	h1 =	0,4335	9,0880	17,8239	12,3511	30,70%	4,9255	33,1754	34,9073	32,3016	36,3595
28	2018	428988	Alfian Aufa Valerian	9,50	0,88	1,531	0,63	4,9010	2,2977	0,9645	3,7303	4,7991	4,6289	0,3548	0,3257	5,1535	0,0588	Terendam	h3 =	1,7955	1,4688	3,6768	-1,4767	140,16%	3,1055	29,5696	25,9358	21,9863	28,4358
29	2018	428994	Ardianus Imanuel Z	11,80	2,03	1,013	0,69	2,8879	1,5207	0,6990	3,2560	4,1317	2,8879	0,3877	0,3877	3,0988	0,0000	Bebas	h1 =	0,6990	3,2560	4,2981	1,1993	72,10%	2,1890	17,6164	15,4999	13,1338	17,0595
30	2018	428997	Dicky Suryanto	20,80	2,01	0,744	0,64	2,9780	2,2338	0,4762	10,3091	14,0878	6,7080	0,1950	0,6591	3,6064	-0,5561	H3-LA-H2	h1 =	1,6610	1,5823	3,6809	0,0745	97,98%	1,3170	22,6419	9,3792	37,3913	10,4177
31	2018	429000	Fadel Damarjati	10,80	2,36	0,432	0,70	2,0740	1,2966	0,3024	9,0078	12,2488	3,7040	0,2101	0,5015	2,3274	-0,4401	H3-LA-H2	h1 =	0,7628	2,2486	2,6360	0,3086	88,29%	1,3112	14,6075	9,3064	20,4099	10,3117
32	2018	429003	Fauzan Yudhistira H	2,80	1,30	0,261	0,65	2,3373	0,7845	0,1697	10,0894	13,7773	2,3373	0,1973	0,1973	2,3815	0,0000	Bebas	h1 =	0,1697	10,0894	8,5578	6,1763	27,83%	2,1677	14,2577	15,3702	13,0060	15,8482
33	2018	429004	Geraldo Benedict T S	15,00	2,65	0,996	0,57	4,8800	1,4940	0,5677	4,3314	5,6459	3,2053	0,3229,															

Modul 4A: Data Loncat Air di Pintu Air Untuk Latihan & Evaluasi Mahasiswa Peserta Hidraulika Saluran Terbuka Kelas B

Loncat Air Bebas

$$\phi = \frac{h_2}{h_1} = \frac{1}{2} \left(\sqrt{1 + 8Fr_1^2} - 1 \right) \dots \text{(I)}$$

$$Fr = \frac{V}{\sqrt{g \frac{A \cos \theta}{B \beta}}} \rightarrow Fr^2 = \frac{\beta V^2}{g \frac{A \cos \theta}{B}}$$

dengan *h* adalah kedalaman air diukur vertikal

dengan *d* adalah kedalaman air diukur tegak lurus dasar

Umum:
$$h_{kritik} : \frac{A^3}{W} = \frac{\alpha Q^2}{g}$$

Persegi:
$$h_{kritik} : h_{kritik}^3 = \frac{\alpha Q^2}{gB^2} \rightarrow h_{kritik} = \sqrt[3]{\frac{\alpha Q^2}{gB^2}}$$

Loncat Air Terendam

Govinda Rao (1963)

$$\frac{h_3}{h_1} = \sqrt{(1+S)^2 \phi^2 - 2Fr_1^2 + \frac{2Fr_1^2}{(1+S)\phi}} \dots \text{(II)}$$

$$S = \frac{h_4 - h_2}{h_2}$$

$$L_{lat} = (4,9S + 6,1)h_2$$

Ven Te Chow (1959)

$$\frac{h_3}{h_4} = \sqrt{1 + 2Fr_4^2 \left(1 - \frac{h_4}{h_1}\right)} \dots \text{(III)}$$

Loncat Air Bebas Dasar Saluran Datar

1. Kehilangan tenaga:
$$\Delta E_{la} = E_1 - E_2 = \left(h_1 + \frac{\alpha V_1^2}{2g} \right) - \left(h_2 + \frac{\alpha V_2^2}{2g} \right)$$

2. Efisiensi:
$$e_{la} = \frac{E_2}{E_1}$$

3. Tinggi:
$$h_{la} = h_2 - h_1$$

4. Panjang Loncat Air L_{la} :

4a. KazimierzWóycicki (1931):
$$L_{la} = \left(8 - 0,05 \frac{h_2}{h_1} \right) (h_2 - h_1)$$

4b. Jan Smetana (1933) :
$$L_{la} = 6(h_2 - h_1)$$

4c. Silvester (1964):
$$L_{la} = 9,75h_1 (Fr_1 - 1)^{1,01}$$

Koefisien koreksi $\alpha = 1,02$				Koefisien koreksi $\beta = 1,05$													Percepatan gravitasi, $g = 9,80 \text{ m/d}^2$												
Mahasiswa Peserta Kelas B				Data Pintu Air				KB Hilir	Hitungan h_{kr}	Kontraksi Max.	Hitungan Loncat air: (1) terendam, (2) bebas/semurna tepat di depan pintu, dan (3) bebas di hilir pintu mengikuti kurva H3-LA-H2													Panjang Loncat Air					
				$Q \text{ (m}^3\text{/d)}$	$B \text{ (m)}$	Bukaan Pintu (m)	Koef. Kontraksi	Dalam Air (m)	$h \text{ kritik (m)}$	$h \text{ LA hulu (m)}$	Hitungan parameter loncat air						Jenis Loncat Air				Karakteristika Loncat Air				Terendam	Bebas/H3-LA-H2			
No	Angkatan	NIU	Nama	Q	B	d_1	C_v	h_d	h_{kr}	h_1	Fr_1	ϕ	h_2	Fr_2	Fr_4	E_{hilir}	S	Jenis	Simbol	$h_{hulu} \text{ (m)}$	Fr_{hulu}	E_{hulu}	ΔE	Eff	h_{la}	Govinda	Sivester	Smetana	Woycicki
46	2018	431341	Bulan Aura D	4,80	2,43	0,493	0,68	2,0240	0,7405	0,3352	3,3311	4,2373	1,4205	0,3819	0,2245	2,0736	0,4248	Terendam	$h_3 =$	1,4197	0,3822	1,5205	-0,5531	136,38%	0,6043	11,6222	7,6840	6,5116	8,4522
47	2018	431347	Elvira Apriana	14,00	2,60	0,481	0,63	4,3790	1,4451	0,3030	10,5659	14,4508	4,3790	0,1923	0,1923	4,4577	0,0000	Bebas	$h_1 =$	0,3030	10,5659	16,7347	12,2770	26,64%	4,0760	26,7121	28,9085	24,4561	29,6630
48	2018	431350	Fikri Rizal Ma Ruf	14,90	0,78	2,240	0,57	13,4450	3,3614	1,2768	4,3340	5,6496	7,2134	0,3228	0,1268	13,5501	0,8639	Terendam	$h_3 =$	11,1956	0,1669	11,3471	-2,2030	119,41%	2,2494	74,5365	42,0071	35,6194	45,8155
49	2018	431356	Jason Ong	10,90	1,56	0,573	0,55	5,6061	1,7192	0,3152	12,9273	17,7888	5,6061	0,1723	0,1723	5,6870	0,0000	Bebas	$h_1 =$	0,3152	12,9273	25,8959	20,2089	21,96%	5,2910	34,1974	37,5690	31,7459	37,6219
50	2018	431359	Mellin Salsabilla W	7,30	1,38	0,476	0,55	4,6567	1,4281	0,2618	12,9262	17,7872	4,6567	0,1723	0,1723	4,7239	0,0000	Bebas	$h_1 =$	0,2618	12,9262	21,5085	16,7847	21,96%	4,3949	28,4059	31,2062	26,3694	31,2505
51	2018	431362	Muh Yuka Dwi Ananta	14,30	2,41	0,513	0,64	4,6323	1,5417	0,3283	10,3242	14,1091	4,6323	0,1948	0,1948	4,7177	0,0000	Bebas	$h_1 =$	0,3283	10,3242	17,3259	12,6082	27,23%	4,3040	28,2571	30,5216	25,8239	31,3956
52	2018	431365	Muhammad Raffly Suhri	13,30	1,68	1,245	0,68	4,1100	1,8685	0,8466	3,3266	4,2311	3,5820	0,3822	0,3110	4,3031	0,1474	Terendam	$h_3 =$	2,0727	0,8684	2,8319	-1,4712	151,95%	2,0373	24,4374	19,3678	16,4126	21,3048
53	2018	431368	Ondolan Nathan	15,80	2,28	1,139	0,60	3,5330	1,7098	0,6834	4,0151	5,2001	3,5538	0,3386	0,3416	3,7332	-0,0058	H3-LA-H2	$h_1 =$	0,6898	3,9597	5,9426	2,2094	62,82%	2,8432	21,5762	20,1213	17,2222	22,0178
54	2018	431371	Rana Satria Winata	19,60	2,01	1,431	0,70	6,5840	2,1470	1,0017	3,1837	4,0301	4,0370	0,3935	0,1889	6,6982	0,6309	Terendam	$h_3 =$	5,1091	0,2764	5,2986	-1,3995	126,41%	1,4749	37,1060	21,4947	18,2117	23,6707
55	2018	431372	Reinhard	19,50	1,86	1,502	0,65	3,9050	2,2532	0,9763	3,5574	4,5557	4,4477	0,3658	0,4447	4,2801	-0,1220	H3-LA-H2	$h_1 =$	1,1850	2,6604	5,2586	0,9785	81,39%	2,7200	24,4717	19,2809	20,8283	21,3122
56	2018	431374	Ridha Ulfaty	7,60	1,33	0,501	0,66	3,4070	1,5035	0,3307	9,8372	13,4209	4,4377	0,2001	0,2974	3,5534	-0,2323	H3-LA-H2	$h_1 =$	0,5226	4,9505	6,7439	3,1905	52,69%	2,8844	22,0196	20,4090	24,6425	22,1348
57	2018	431377	Setiawan Nugroho	12,80	2,08	0,526	0,64	3,8960	1,5796	0,3366	10,3129	14,0932	4,7443	0,1949	0,2619	4,0258	-0,1788	H3-LA-H2	$h_1 =$	0,4764	6,1264	9,1607	5,1349	43,95%	3,4196	24,7836	24,2026	26,4461	25,9586
58	2018	431378	Syavira Indah Utami	10,30	2,42	0,823	0,67	4,0350	1,2354	0,5514	3,4024	4,3377	2,3918	0,3766	0,1719	4,0929	0,6870	Terendam	$h_3 =$	3,1943	0,2440	3,2867	-0,8062	124,53%	0,8407	22,6417	13,0299	11,0426	14,3244
59	2018	431380	Wahyu Mulyana Pungki	6,20	1,92	0,685	0,58	1,5070	1,0277	0,3973	4,2208	5,4900	2,1812	0,3281	0,5713	1,7459	-0,3091	H3-LA-H2	$h_1 =$	0,6785	1,8914	1,8574	0,1114	94,00%	0,8285	10,0017	5,8900	10,7033	6,5364
60	2018	432353	Aryandhi Jeanvick Budiman	8,20	2,07	0,785	0,65	3,1400	1,1777	0,5103	3,5575	4,5559	2,3247	0,3658	0,2330	3,2228	0,3507	Terendam	$h_3 =$	2,0833	0,4312	2,2715	-0,9513	141,88%	1,0567	18,1756	12,8437	10,8864	14,1019

Soal Loncat Air di Hilir Pintu Air

Pada sebuah saluran irigasi dengan dasar horisontal terdapat pintu air yang digunakan untuk mengatur debit sebesar $Q = 12,80 \text{ m}^3/\text{detik}$. Tampang lintang saluran berbentuk empat persegi panjang dengan lebar dasar 1,70 m.

Bukaan pintu irigasi 1,20 m, kontraksi maksimum terjadi di depan pintu dengan koefisien kontraksi 0,70. Elevasi muka air hilir 4,4570 m diukur dari lantai dasar saluran hilir.

Koefisien koreksi energi Coriolis, $\alpha = 1,02$, koefisien koreksi momentum Boussinesq, $\beta = 1,05$, sedangkan nilai percepatan gravitasi, $g = 9,80 \text{ m/detik}^2$.

- 1 Tentukan jenis loncat air yang terjadi: terendam atau sempurna?
- 2 Tentukan energi yang dihancurkan (ΔE), dan panjang loncat air (L).

Jawaban Soal Loncat Air di Hilir Pintu Air

RUMUS

Loncat Air Bebas

$$\phi = \frac{h_2}{h_1} = \frac{1}{2} \left(\sqrt{1 + 8Fr_1^2} - 1 \right) \dots (I)$$

$$Fr = \frac{V}{\sqrt{g \frac{A \cos \theta}{B}}} \rightarrow Fr^2 = \frac{\beta V^2}{g \frac{A \cos \theta}{B}}$$

dengan h adalah kedalaman air diukur vertikaldengan d adalah kedalaman air diukur tegak lurus dasar

$$\text{Umum: } h_{\text{kritik}} : \frac{A^3}{W} = \frac{\alpha Q^2}{g}$$

$$\text{Persegi: } h_{\text{kritik}} : h_{\text{kritik}}^3 = \frac{\alpha Q^2}{gB^2} \rightarrow h_{\text{kritik}} = \sqrt[3]{\frac{\alpha Q^2}{gB^2}}$$

Loncat Air Terendam

Govinda Rao (1963)

$$\frac{h_2}{h_1} = \sqrt{(1+S)^2 \phi^2 - 2Fr_1^2 + \frac{2Fr_1^2}{(1+S)\phi}} \dots (II)$$

$$S = \frac{h_4 - h_2}{h_2}$$

$$L_{\text{lar}} = (4,9S + 6,1)h_2$$

Ven Te Chow (1959)

$$\frac{h_2}{h_4} = \sqrt{1 + 2Fr_4^2 \left(1 - \frac{h_4}{h_1}\right)} \dots (III)$$

Loncat Air Bebas Dasar Saluran Datar

$$1. \text{ Kehilangan tenaga: } \Delta E_{\text{la}} = E_1 - E_2 = \left(h_1 + \frac{\alpha V_1^2}{2g} \right) - \left(h_2 + \frac{\alpha V_2^2}{2g} \right)$$

$$2. \text{ Efisiensi: } e_{\text{la}} = \frac{E_2}{E_1}$$

$$3. \text{ Tinggi: } h_{\text{la}} = h_2 - h_1$$

$$4. \text{ Panjang Loncat Air } L_{\text{la}} :$$

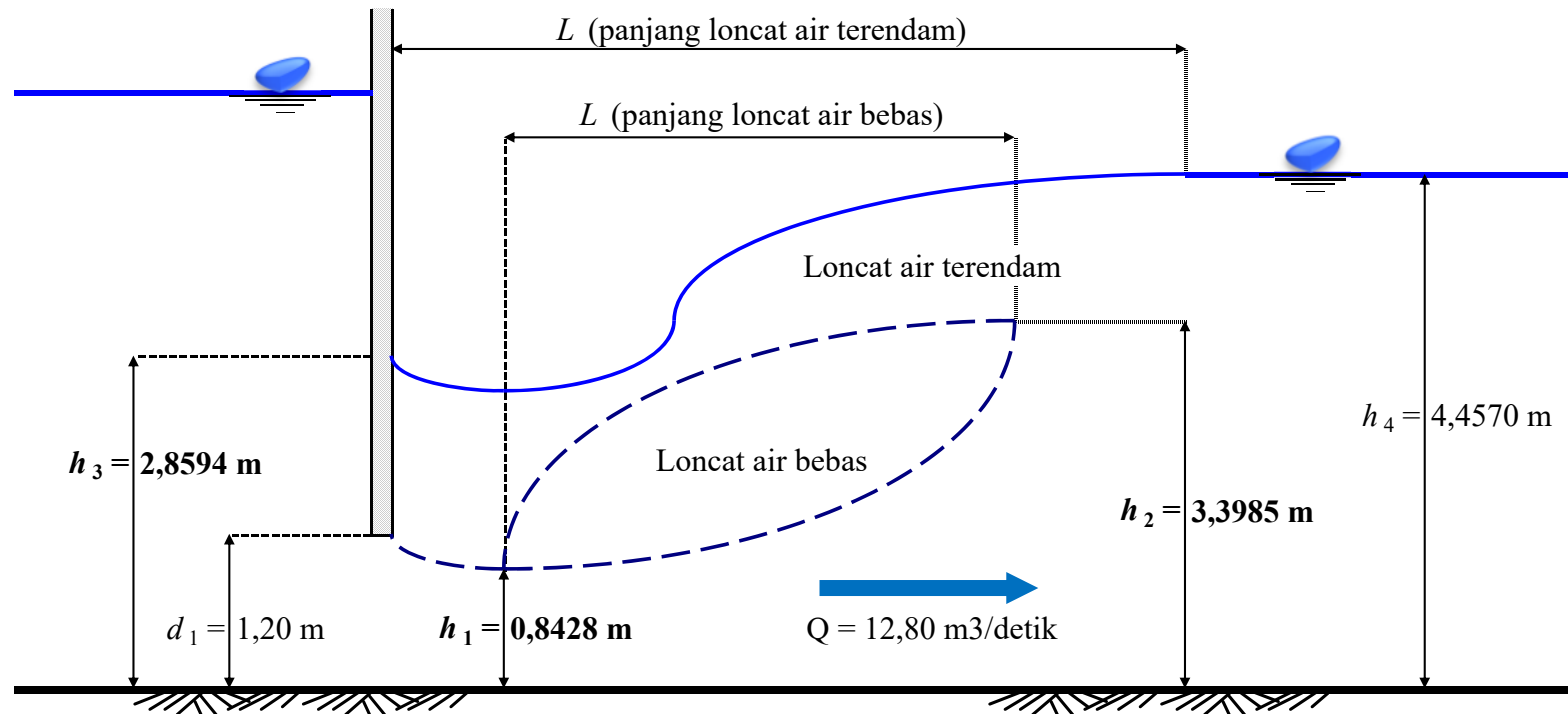
$$4a. \text{ Kazimierz Wóycicki (1931): } L_{\text{la}} = \left(8 - 0,05 \frac{h_2}{h_1} \right) (h_2 - h_1)$$

$$4b. \text{ Jan Smetana (1933): } L_{\text{la}} = 6(h_2 - h_1)$$

$$4c. \text{ Silvester (1964): } L_{\text{la}} = 9,75h_1 (Fr_1 - 1)^{1,01}$$

DIKETAHUI:	$Q =$	12,800 m ³ /detik	$\alpha =$	1,02	$d_1 =$	1,20 m	$g =$	9,80 m/detik ²
	Lebar dasar, $B =$	1,70 m	$\beta =$	1,05	$C_{\text{vc}} =$	0,70	$h_4 =$	4,457 m

DIHITUNG:	$q = (12,80 \text{ m}^3/\text{d})/(1,70 \text{ m}) =$	7,5294 m ³ /d/m
	$h_1 = 0,70 \cdot 1,20 \text{ m} =$	0,8428 m (kontraksi maksimum)
	$V_1 = (7,5294 \text{ m}^3/\text{d})/(0,8428 \text{ m}) =$	8,9338 m/detik
	$\alpha V_1^2/2g = 1,02 \cdot 8,9338^2/(2 \cdot 9,80) =$	4,1535 m
	$Fr_1^2 = 1,05 \cdot 8,9338^2/(9,80 \cdot 0,8428) =$	10,1464 ($Fr \approx 3,185 > 1$, aliran superkritik)
	$V_4 = (7,5294 \text{ m}^3/\text{d})/(4,4570 \text{ m}) =$	1,6893 m/detik
	$\alpha V_4^2/2g = 1,02 \cdot 1,6893^2/(2 \cdot 9,80) =$	0,1485 m
	$Fr_4^2 = 1,05 \cdot 1,6893^2/(9,80 \cdot 4,4570) =$	0,0686 ($Fr \approx 0,262 < 1$, aliran subkritik)
	$\phi = h_2/h_1 = [\sqrt{(1 + 8 \cdot 10,1464) - 1}]/2 =$	4,0324 ... (I)
	$h_2 = 4,0324 \cdot 0,8428 =$	3,3985 m
	$S = 4,4570/3,3985 - 1$	0,3115 m
	$(1+S) \phi = \{1 + (0,3115)\} \cdot 4,0324$	5,2883 m
	$V_2 = (7,5294 \text{ m}^3/\text{d})/(3,3985 \text{ m}) =$	2,2155 m/detik
	$\alpha V_2^2/2g = 1,02 \cdot 2,2155^2/(2 \cdot 9,80) =$	0,2554 m
	$Fr_2^2 = 1,05 \cdot 2,2155^2/(9,80 \cdot 3,3985) =$	0,1547 ($Fr \approx 0,393 < 1$, aliran subkritik)
Govinda Rao (1963):	$h_3 = \sqrt{[5,2883^2 + 2 \cdot 10,1464 \cdot (1/5,2883 - 1)]} \cdot 0,8428$	
	$= 2,8594 \text{ m}$	
Ven Te Chow (1959):	$h_3 = \sqrt{[1 + 2 \cdot 0,0686 \cdot (1 - 4,4570/0,8428)]} \cdot 4,4570$	
	$= 2,8594 \text{ m}$	
	$E_1 =$	4,9963 m = 0,8428 + 4,1535
	$E_2 =$	3,6540 m = 3,3985 + 0,2554
	$E_4 =$	4,6055 m = 4,4570 + 0,1485
1. Terjadi Loncat Air Terendam		
	$\Delta E_{\text{la}} = E_3 - E_4 = 3,2203 - 4,6055 = -1,3853 \text{ m}$	
	$e_{\text{la}} = E_4 / E_3 = 4,6055 / 3,2203 = 143,02\%$	
	$h_{\text{la}} = h_4 - h_3 = 4,4570 - 2,8594 = 1,5976 \text{ m}$	
2a. Terjadi Loncat Air Terendam dengan Panjang Loncat Air		
	Ven Te Chow (1959) & Govinda Rao (1963), $L = (4,9 \cdot 0,3115 + 6,1) \cdot 3,3985 = 25,9175 \text{ m}$	
2b. Tidak Terjadi Loncat Air Bebas (hitungan di bawah tidak berlaku)		
	Silvester (1964), $L = 9,75 \cdot (\sqrt{10,1464} - 1)^{1,01} \cdot 0,8428 = 18,0985 \text{ m}$	
	Smetana (1933), $L = 6 \cdot (3,3985 - 0,8428) = 15,3343 \text{ m}$	
	Wóycicki (1931), $L = \{8 - 0,05 \cdot (3,3985/0,8428)\} \cdot (3,3985 - 0,8428) = 19,9305 \text{ m}$	



LONCAT AIR TERENDAM

Buku Acuan: (1) Open-Channel Hydraulics, Bab. 3, halaman 60, 1959, oleh Ven Te Chow, McGraw-Hill Book Company

(2) Open-Channel Hydraulics, Bab. 3, halaman 86, 1985, oleh Richard H. French, McGraw-Hill Book Company