# BAB V
# PENUTUP

## 5.1 Kesimpulan

Berdasarkan hasil eksperimen yang telah dilaksanakan terhitung dari tanggal 13 Februari 2021 dilakukan survey lokasi hingga pengolahan data eksperimen dengan jumlah debris kayu 120 buah dengan debit yang berbeda dalam setiap pelaksanaannya, sehingga dapat ditarik kesimpulan yaitu:

1. Bangunan sabo dam di Sungai Nangka belum optimal dalam mengendalikan aliran debris kayu. Hal ini dapat dilihat dari banyaknya debris kayu yang hanyut sampai kebagian hilir sabo dam dengan adanya debit 90 $cm^2/s$, 85 $cm^2/s$, 116 $cm^2/s$, 122 $cm^2/s$, 102 $cm^2/s$, 84 $cm^2/s$, 63 $cm^2/s$, 107 $cm^2/s$, 235 $cm^2/s$ dan 174 $cm^2/s$ yang diberikan.
2. Penambahan elevasi dasar sungai pada hulu sabodam sangat dipengaruhi oleh besar kecilnya debit yang terjadi, semakin besar debit yang terjadi maka elevasi dasar sungai akan semakin tinggi dan banyak yang hanyut ke bagian hilir.
3. Dengan adanya penambahan elevasi dasar Sungai Nangka ini berpengaruh juga terhadap kenaikan muka air yang terjadi pada sabo dam. Semakin tinggi elevasi dasar sungai maka semakin tinggi juga kenaikan muka air. Dengan fakta-fakta yang didapat dari eksperimen yang dilakukan berdasarkan keadaan Sungai Nangka maka dalam kondisi banjir, air di Sungai Nangka mampu meluap melalui permukaan atas sabo dam dan mampu menghanyutkan bangunan-bangunan yang berada di hilir.

## 5.2 Saran

Penulis berharap kedepannya ada penelitian lebih lanjut lagi mengenai aliran campuran debris kayu dan sedimen pada hulu Sungai Nangka agar dilakukan penelitian yang berbeda dengan diameter kayu dan debit banjir yang berbeda.

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# LAMPIRAN I

UNIVERSITAS MUHAMMADIYAH MATARAM
FAKULTAS TEKNIK
PROGRAM STUDI REKAYASA SIPIL
Jln. K.H. Ahmad Dahlan, No.1 Pegesangan, Mataram Kode Pos:83232

## LEMBAR KONSULTASI SKRIPSI

NAMA : HASRUL AZMI
NIM : 417110156

| NO | HARI / TANGGAL | CATATAN/REVISI | PARAF |
|---|---|---|---|
| 4 | 08/6/2021 | - perbaiki satuan debit (L) gunakan $q = cm^3/s$<br>$\gamma = \frac{W}{V} = \frac{m.g}{V}$<br>$V = \frac{m.g}{\gamma}$ $= \gamma\ 1000\ N/m^3$<br>Ubah satuan ke dalam cm.<br>- Tunjukkan prosedur perhitungan q dan prosedur eksperimen<br>- Susunlah perhitungan debit "besar" dan "kecil"<br>- Buat tabel excel | |

Mataram, 2021

**DosenPembimbing I**

**Dr. Eng M. Islamy Rusida, ST., MT**
**NIDN.0824017501**

**UNIVERSITAS MUHAMMADIYAH MATARAM**
**FAKULTAS TEKNIK**
**PROGRAM STUDI REKAYASA SIPIL**
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## LEMBAR KONSULTASI SKRIPSI

NAMA : HASRUL AZMI
NIM : 417110156

| NO | HARI / TANGGAL | CATATAN/REVISI | PARAF |
|---|---|---|---|
| | 30/7/2021 | - Perbaiki gambar potongan satu dan, sesuaikan ukuran kolom. Buat 3D, potongan sagital dan layer site plan<br>- Cek perhitungan contoh tulang lengan yang terbaru<br>- perbaik gambar, ukuran gambar harus konsisten | |
| | 09/8/2021 | Ukuran tebal harus tulis pada bab IV, di hasil chapman<br>perbaik gambar 9.20 9.21. lengkapi sesuai pagar, tangga dan dalam tabel 9.5 arsir diganti gambar | |

Mataram, 2021

**DosenPembimbing I**

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## LEMBAR KONSULTASI SKRIPSI

NAMA : HASRUL AZMI
NIM : 417110156

| NO | HARI / TANGGAL | CATATAN/REVISI | PARAF |
|---|---|---|---|
| | 2/7 2021 | - Lebih dete perhitungan tinggi muka air tanggul elevasi<br>- Dasar flume.<br>- Cek penbahan dasar flume.<br>- Data debit dipenbaik disesuaikan dengan perhitungan Rs di tabelkan. L = $m^3/s$ | |
| | 16/7 2021 | - Perbaik. gambar lintas dasar flume.<br>- Tambahkan data bahan kayu Catatlah | |

Mataram, 2021

**DosenPembimbing I**

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## LEMBAR KONSULTASI SKRIPSI

NAMA : HASRUL AZMI
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| NO | HARI / TANGGAL | CATATAN/REVISI | PARAF |
|---|---|---|---|
| | | | |

Mataram, 2021

**DosenPembimbing I**

**Dr. Eng M. Islamy Rusida, ST., MT**
**NIDN.0824017501**

UT - 1

Perihal : Usulan Dosen Pembimbing Tugas AKhir / Skripsi

Kepada : Yth. Dekan Fakultas Teknik
Universitas Muhammadiyah Mataram

Sehubungan dengan rencana ujian Tugas Akhir/Skripsi Mahasiswa :

Nama : HASRUL AZMI

No. Mahasiswa : U1911015 6

Program studi : TEKNIK SIPIL

Judul Tugas Akhir/Skripsi : UJI MODEL FISIK DI HULU SPILLWAY SABO DAM SUNGAI NANGKA KECAMATAN SEMBELIA DALAM MENGENDALIKAN ALIRAN SEDIMEN DAN DEBRIS KAYU (KAJIAN EKSPERIMEN)

Lokasi Penelitian : LABORATORIUM HIDROLIKA UNIVERSITAS MUHAMMADIYAH MATARAM

Maka kami mengajukan Dosen Pembimbing Skripsi seperti berikut, untuk dapat diproses lebih lanjut :

| NO | NAMA | BIDANG KEAHLIAN | INSTANSI ASAL |
|---|---|---|---|
| 1 | Dr. Eng. M. Islamy Rusyda, ST., MT | AIR | UMMAT |
| 2 | Ir. Agus Partono, MT | | UMMAT |
| 3 | Agustini Ernawati, ST., M.Tech | AIR | UMMAT |
| 4 | Titik Wahyoningrih, ST., MT | JALAN | UMMAT |

Bersama surat ini saya lampirkan fotokopi kwitansi pembayaran Skripsi sebanyak 2 lembar, Fotokopi KRS, dan fotokopi lembar pengajuan Judul Skripsi.

Demikian, atas perhatian dan kerjasamanya diucapkan terima kasih.

Mataram, .....

Mahasiswa yang bersangkutan,

(HASRUL AZMI)

**Kelengkapan Administrasi:**

1. Pembayaran Skripsi/TA dibayarkan ke Rekening Fakultas dengan No. Rek BNI Syariah : 0754891838
2. Pembayaran Skripsi sebesar Rp 800.000,- (delapan ratus ribu rupiah)
3. Fotokopi KRS yg di kumpulkan merupakan Fotokopi KRS semester berjalan yang menunjukkan telah mengambil MK Skripsi/TA

Perihal : Surat Permohonan Judul Skripsi/ Tugas Akhir

Yang bertanda tangan dibawah ini :

Nama : HASRUL AZMI

Nomor Mahasiswa : C1A110056

Jurusan/Prog.studi : Rekayasa Sipil /~~D3 Teknik Pertambangan~~/ ~~S1 Teknik Pertambangan~~ / ~~PWK~~ *

Sehubungan saya telah dinyatakan memenuhi persyaratan Akademik, maka dengan ini saya mengajukan judul skripsi/tugas akhir sebagai berikut :

1. UJI MODEL FISIK DI HULU SPILLWAY SABO DAM SUNGAI NANGEA KECAMATAN SEMBELIA DALAM MENGENDALIKAN ALIRAN SEDIMEN DAN DEBRIS KAYU (FLOAM EKSPERIMEN)
2. ANALISIS PRILAKU WOOD DEBRIS - SEDIMENT WATER MIXTURE FLOW DI HULU SPILLWAY SABO DAM SUNGAI NANGEA KECAMATAN SEMBELIA
3. ANALISA SEDIMEN DASAR PADA HULU SPILLWAY SABO DAM SUNGAI NANGEA DESA BELANTING

Atas perhatian dan kebijaksanaan Bapak/Ibu saya haturkan terima kasih.

MATARAM, 17 Maret 2021

Dosen Pembimbing Akademik,

( )

Mahasiswa,

( Hasrul Azmi )

Mengetahui :
Ketua Program Studi,

( )

*coret yang tidak perlu

# LAMPIRAN II

**Tabel Jumlah Kayu yang tertahan pada hulu Sabo Dam**

| No Eksperimen | Jumlah Debris | | | | | | | | | Debit rata-rata ($cm^2/s$) |
|---|---|---|---|---|---|---|---|---|---|---|
| | Dihanyutkan | Tertahan pada jarak | | | | | | | | |
| | Total (batang) | Total (batang) | 0-0.5 m (batang) | 0.5-1.5 m (batang) | 1.5-2.5 m (batang) | 2.5-3.5 m (batang) | 3.5-4.5 m (batang) | 4.5-5.5 m (batang) | 5.5-6.5 m (batang) | |
| 1 | 120 | 11 | 0 | 0 | 2 | 0 | 0 | 0 | 9 | 90.00 |
| 2 | 120 | 9 | 0 | 0 | 1 | 7 | 0 | 0 | 1 | 85.00 |
| 3 | 120 | 32 | 3 | 0 | 0 | 0 | 6 | 2 | 21 | 116.00 |
| 4 | 120 | 33 | 4 | 1 | 0 | 0 | 0 | 9 | 19 | 122.00 |
| 5 | 120 | 10 | 7 | 2 | 0 | 0 | 1 | 0 | 0 | 102.00 |
| 6 | 120 | 88 | 10 | 0 | 1 | 1 | 1 | 12 | 63 | 84.00 |
| 7 | 120 | 79 | 28 | 2 | 0 | 0 | 11 | 19 | 19 | 63.00 |
| 8 | 120 | 40 | 14 | 11 | 10 | 1 | 1 | 3 | 0 | 107.00 |
| 9 | 120 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 235.00 |
| 10 | 120 | 11 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 174.00 |

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# EKSPERIMEN (1)

HARI/TANGGAL

JUMLAH KAY : 120 BIJI

DEBIT : 90 $cm^2$/sec

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**2021**

**Eksperimen** : **1**

**debit (q)** : **90 m²/sec**

**jumlah kayu** :

| No Eksperimen | Ukuran batang (cm) | Jumlah batang |
|---|---|---|
| | 7.5 | |
| 1 | 120 | 120 |

**waktu** : **39.9 sec**

**diameter kayu** : **6 mm**

**Posisi kayu** :

| | | |
|---|---|---|
| **hulu** | : | 11 |
| **hilir** | : | 0 |
| **sabo** | : | 0 |
| **lolos** | : | 109 |
| | ∑ = | 120 |

Tabel Pengukuran elevasi muka air dengan point gage

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | | | | | | | |
| 22.5 | | | | | | | |
| 15 | 26.23 | 26.29 | 26 | 26.04 | 22.17 | 21.03 | 21.44 |
| 7.5 | | | | | | | |
| 1.2 | | | | | | | |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | |
| 22.5 | | | | | | | | |
| 15 | 21.55 | 22.13 | 22.29 | 22.59 | 23.22 | 23.3 | 23.66 | 23.66 |
| 7.5 | | | | | | | | |
| 1.2 | | | | | | | | |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | | | | | | | |
| 22.5 | | | | | | | |
| 15 | 25.26 | 26.1 | 26.1 | 26.28 | 26.26 | 26.27 | |
| 7.5 | | | | | | | |
| 1.2 | | | | | | | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | |
| 22.5 | | | | | | | | |
| 15 | 27.49 | 28.49 | 28.49 | 28.59 | 28.64 | 29.15 | 29.15 | |
| 7.5 | | | | | | | | |
| 1.2 | | | | | | | | |

Tabel Elevasi tinggi muka air  tertahan

| Hasil Data | -20 | -15 | -10 |
|---|---|---|---|
| Elevasi rata rata | 26.23 | 26.29 | 26 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 |
| H air | 0.85 | 0.79 | 1.08 |
| Elevasi air tanpa sabo Q 90 | 26.3 | 26.3 | 26.3 |
| h air normal | 0.78 | 0.78 | 0.78 |
| Penambahan H air akibat sabo | 0.07 | 0.01 | 0.30 |

| Hasil Data | -5 | -3.5 | 1.2 | 5 | 10 |
|---|---|---|---|---|---|
| Elevasi rata rata | 26.04 | 22.17 | 21.03 | 21.44 | 21.55 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 1.04 | 4.91 | 6.05 | 5.64 | 5.53 |
| Elevasi air tanpa sabo Q 90 | 26.3 | 26.3 | 26.3 | 26.3 | 26.3 |
| h air normal | 0.78 | 0.78 | 0.78 | 0.78 | 0.78 |
| Penambahan H air akibat sabo | 0.26 | 4.13 | 5.27 | 4.86 | 4.75 |

| Hasil Data | 15 | 20 | 25 | 30 | 35 |
|---|---|---|---|---|---|
| Elevasi rata rata | 22.13 | 22.29 | 22.59 | 23.22 | 23.3 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 4.95 | 4.79 | 4.49 | 3.86 | 3.78 |
| Elevasi air tanpa sabo Q 90 | 26.3 | 26.3 | 26.3 | 26.3 | 26.3 |

| | | | | | |
|---|---|---|---|---|---|
| h air normal | 0.78 | 0.78 | 0.78 | 0.78 | 0.78 |
| Penambahan H air akibat sabo | 4.17 | 4.01 | 3.71 | 3.08 | 3.00 |

| Hasil Data | 40 | 45 | 65 | 70 | 75 |
|---|---|---|---|---|---|
| Elevasi rata rata | 23.66 | 23.66 | 25.26 | 26.1 | 26.1 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 3.42 | 3.42 | 1.82 | 0.98 | 0.98 |
| Elevasi air tanpa sabo Q 90 | 26.3 | 26.3 | 26.3 | 26.3 | 26.3 |
| h air normal | 0.78 | 0.78 | 0.78 | 0.78 | 0.78 |
| Penambahan H air akibat sabo | 2.64 | 2.64 | 1.04 | 0.20 | 0.20 |

| Hasil Data | 80 | 85 | 90 | 95 | 100 |
|---|---|---|---|---|---|
| Elevasi rata rata | 26.28 | 26.26 | 26.27 | | 27.49 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | | 27.08 |
| H air | 0.8 | 0.82 | 0.81 | | -0.41 |
| Elevasi air tanpa sabo Q 90 | 26.3 | 26.3 | 26.3 | | 26.3 |
| h air normal | 0.78 | 0.78 | 0.78 | | 0.78 |
| Penambahan H air akibat sabo | 0.02 | 0.04 | 0.03 | | -1.19 |

| Hasil Data | 115 | 120 | 125 | 130 | 135 |
|---|---|---|---|---|---|
| Elevasi rata rata | 28.49 | 28.49 | 28.59 | 28.64 | 29.15 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | -1.41 | -1.41 | -1.51 | -1.56 | -2.07 |

| | | | | | |
|---|---|---|---|---|---|
| Elevasi air tanpa sabo Q 90 | 26.3 | 26.3 | 26.3 | 26.3 | 26.3 |
| h air normal | 0.78 | 0.78 | 0.78 | 0.78 | 0.78 |
| Penambahan H air akibat sabo | -2.19 | -2.19 | -2.29 | -2.34 | -2.85 |

| Hasil Data | 140 | 145 |
|---|---|---|
| Elevasi rata rata | 29.15 | |
| Elevasi dasar fluem | 27.08 | |
| H air | -2.07 | |
| Elevasi air tanpa sabo Q 90 | 26.29 | |
| h air normal | 0.79 | |
| Penambahan H air akibat sabo | -2.86 | |

Tabel hasil pengukuran debit sebelum pengukuran

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 6.95 | 21 | 2 | 19 | 91.13 |
| no. 2 (t = 90 detik ) | 5.05 | 16 | 2 | 14 | 92.41 |

Tabel hasil pengukuran debit saat pengukuran

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 5.5 | 17 | 2 | 15 | 90.91 |
| no. 2 (t = 90 detik ) | 5.12 | 16 | 2 | 14 | 91.15 |

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 6.63 | 19 | 2 | 17 | 85.47 |
| no. 2 (t = 90 detik ) | 5.94 | 18 | 2 | 16 | 89.79 |

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 6.61 | 20 | 2 | 18 | 90.77 |
| no. 2 (t = 90 detik ) | 6.58 | 19 | 2 | 17 | 86.12 |

Tabel Pengukuran elevasi dasar saluran dengan point gage

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | 27.45 | 28.53 | 28.47 | 28.58 | 27.42 | 23.52 | 24.52 |
| 22.5 | 27.42 | 28.57 | 28.55 | 28.23 | 27.44 | 25.31 | 24.31 |
| 15 | 28.59 | 28.22 | 28.49 | 28.36 | 28.57 | 24.31 | 25.31 |
| 7.5 | 28.31 | 28.34 | 28.51 | 27.68 | 27.25 | 23.35 | 24.35 |
| 1.2 | 28.46 | 28.54 | 28.63 | 27.42 | 27.36 | 24.33 | 23.33 |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | 25.52 | 26.52 | 26.34 | 26.43 | 27.42 | 27.44 | 27.41 | 27.41 |
| 22.5 | 25.31 | 26.31 | 26.32 | 26.52 | 25.42 | 26.42 | 26.42 | 26.42 |
| 15 | 25.31 | 25.31 | 27.44 | 26.41 | 26.33 | 27.41 | 25.5 | 25.5 |
| 7.5 | 25.35 | 26.35 | 26.41 | 27.47 | 28.44 | 27.42 | 27.41 | 27.41 |
| 1.2 | 25.33 | 26.33 | 27.41 | 27.45 | 27.41 | 27.46 | 27.51 | 27.51 |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | 26.51 | 27.12 | 26.33 | 27.37 | 27.11 | 28.36 | |
| 22.5 | 24.46 | 25.28 | 26.45 | 26.05 | 27.28 | 25.58 | |
| 15 | 26.42 | 27.24 | 27.11 | 26.31 | 23.97 | 24.42 | |
| 7.5 | 26.58 | 27.06 | 27.31 | 24.55 | 24.24 | 24.18 | |
| 1.2 | 26.09 | 27.04 | 27.25 | 26.32 | 25.37 | 24.26 | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | 26.34 | 26.34 | 26.12 | 26.14 | 26.38 | 27.11 | 25.41 | |
| 22.5 | 25.17 | 25.17 | 25.06 | 25.22 | 25.18 | 26.21 | 26.22 | |
| 15 | 25.21 | 25.21 | 25.24 | 24.51 | 25.46 | 25.31 | 26.22 | |
| 7.5 | 24.41 | 24.41 | 24.18 | 24.54 | 26.25 | 25.38 | 25.27 | |
| 1.2 | 25.01 | 25.01 | 25.33 | 25.33 | 25.33 | 25.58 | 26.17 | |

Tabel kenaikan elevasi dasar sungai

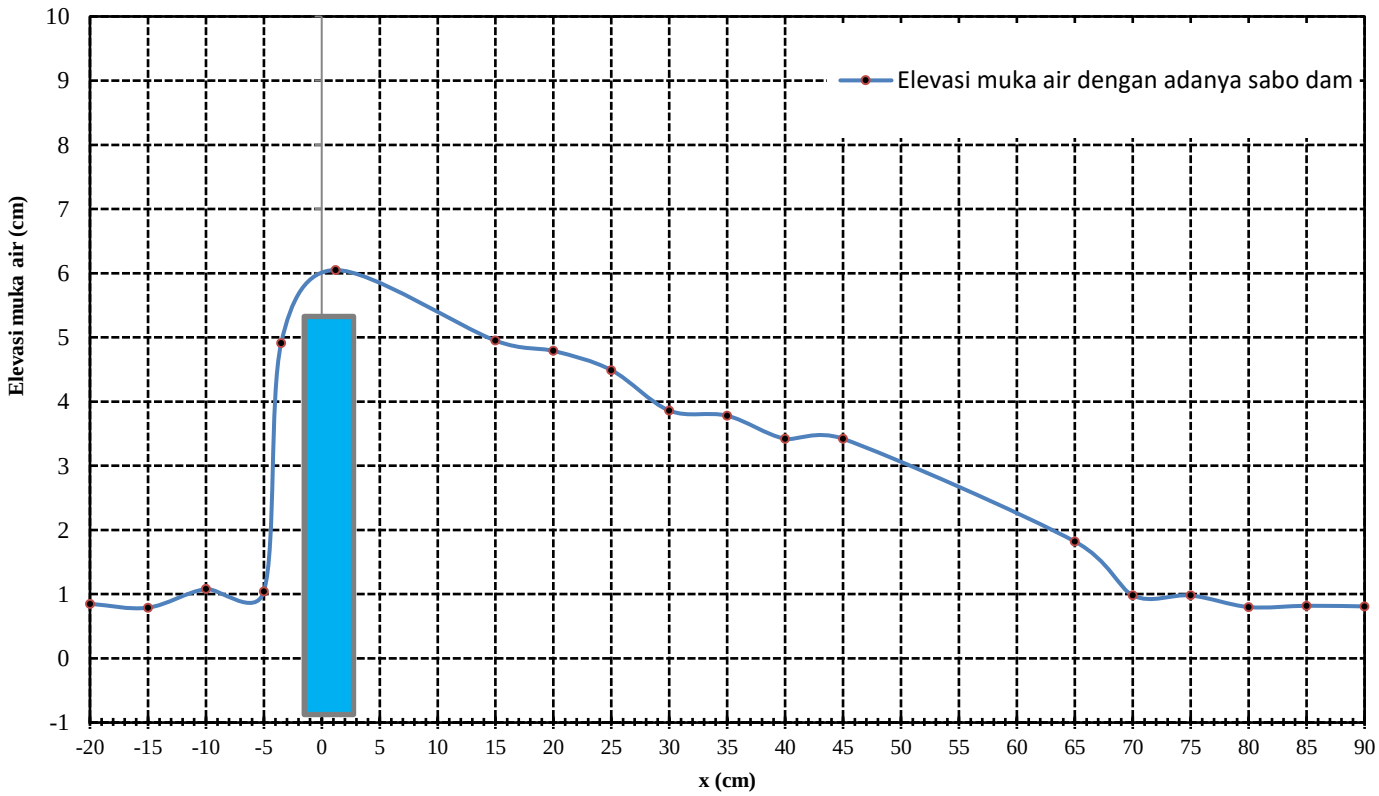
| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | 1.56 | 0.56 | 0.74 | 0.65 | -0.34 | -0.36 | -0.33 |
| 22.5 | 1.77 | 0.77 | 0.76 | 0.56 | 1.66 | 0.66 | 0.66 |
| 15 | 1.77 | 1.77 | -0.36 | 0.67 | 0.75 | -0.33 | 1.58 |
| 7.5 | 1.73 | 0.73 | 0.67 | -0.39 | -1.36 | -0.34 | -0.33 |
| 1.2 | 1.75 | 0.75 | -0.33 | -0.37 | -0.33 | -0.38 | -0.43 |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | 0.57 | -0.04 | 0.75 | -0.29 | -0.03 | -1.28 | -0.33 | -0.33 |
| 22.5 | 2.62 | 1.80 | 0.63 | 1.03 | -0.20 | 1.50 | 0.66 | 0.66 |
| 15 | 0.66 | -0.16 | -0.03 | 0.77 | 3.11 | 2.66 | 1.58 | 1.58 |
| 7.5 | 0.50 | 0.02 | -0.23 | 2.53 | 2.84 | 2.90 | -0.33 | -0.33 |
| 1.2 | 0.99 | 0.04 | -0.17 | 0.76 | 1.71 | 2.82 | -0.43 | -0.43 |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | 0.74 | 0.74 | 0.96 | 0.94 | 0.70 | -0.03 | |
| 22.5 | 1.91 | 1.91 | 2.02 | 1.86 | 1.90 | 0.87 | |
| 15 | 1.87 | 1.87 | 1.84 | 2.57 | 1.62 | 1.77 | |
| 7.5 | 2.67 | 2.67 | 2.90 | 2.54 | 0.83 | 1.70 | |
| 1.2 | 2.07 | 2.07 | 1.75 | 1.75 | 1.75 | 1.50 | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | 0.74 | 0.74 | 0.96 | 0.94 | 0.70 | -0.03 | 1.67 | |
| 22.5 | 1.91 | 1.91 | 2.02 | 1.86 | 1.90 | 0.87 | 0.86 | |
| 15 | 1.87 | 1.87 | 1.84 | 2.57 | 1.62 | 1.77 | 0.86 | |
| 7.5 | 2.67 | 2.67 | 2.90 | 2.54 | 0.83 | 1.70 | 1.81 | |
| 1.2 | 2.07 | 2.07 | 1.75 | 1.75 | 1.75 | 1.50 | 0.91 | |

# GRAFIK KENAIKAN ELEVASI MUKA AIR



**LABORATORIUM HIDROLIKA**
**JURUSAN TEKNIS SIPIL**
**UNIVERSITAS MUHAMMADIYAH MATARAM**

# EKSPERIMEN (2)

HARI/TANGGAL

JUMLAH KAYU : 120 BIJI

DEBIT : 85 $cm^2$/sec

**LABORATORIUM HIDROLIKA**
**JURUSAN TEKNIS SIPIL**
**UNIVERSITAS MUHAMMADIYAH MATARAM**
**2021**

**Eksperimen** : **2**

**debit (q)** : **85 m²/sec**

**jumlah kayu** :

| No eksperimen | Ukuran batang (cm) | Jumlah Batang |
|---|---|---|
| | 7.5 | |
| 2 | 120 | 120 |

**waktu** **19,41 sec**

**diameter kayu** **5 mm**

| | | | | |
|---|---|---|---|---|
| **Posisi kayu** | : | **hulu** | : | 9 |
| | : | **hilir** | : | 0 |
| | | **sabo** | : | 0 |
| | : | **lolos** | : | 111 |
| | | | ∑ = | 120 |

Tabel Pengukuran elevasi muka air dengan point gage

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | | | | | | | |
| 22.5 | | | | | | | |
| 15 | 26.24 | 26.31 | 26.43 | 26.41 | 21.7 | 21.03 | 21.44 |
| 7.5 | | | | | | | |
| 1.2 | | | | | | | |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | |
| 22.5 | | | | | | | | |
| 15 | 21.75 | 22.13 | 22.29 | 22.59 | 23.22 | 23.3 | 23.66 | 23.66 |
| 7.5 | | | | | | | | |
| 1.2 | | | | | | | | |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | | | | | | | |
| 22.5 | | | | | | | |
| 15 | 25.26 | 26.1 | 26.1 | 26.28 | 26.28 | 26.27 | |
| 7.5 | | | | | | | |
| 1.2 | | | | | | | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | |
| 22.5 | | | | | | | | |
| 15 | 27.49 | 28.49 | 28.49 | 28.59 | 28.64 | 29.15 | 29.15 | |
| 7.5 | | | | | | | | |
| 1.2 | | | | | | | | |

Tabel Elevasi tinggi muka air  tertahan

| Hasil Data | -20 | -15 | -10 |
|---|---|---|---|
| Elevasi rata rata | 26.24 | 26.31 | 26.43 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 |
| H air | 0.84 | 0.77 | 0.65 |
| Elevasi air tanpa sabo Q 85 | 26.43 | 26.43 | 26.43 |
| h air normal | 0.65 | 0.65 | 0.65 |
| Penambahan H air akibat sabo | 0.19 | 0.12 | 0.00 |

| Hasil Data | -5 | -3.5 | 1.2 | 5 | 10 |
|---|---|---|---|---|---|
| Elevasi rata rata | 26.41 | 21.7 | 21.03 | 21.44 | 21.75 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 0.67 | 5.38 | 6.05 | 5.64 | 5.33 |
| Elevasi air tanpa sabo Q 85 | 26.43 | 26.43 | 26.43 | 26.43 | 26.43 |
| h air normal | 0.65 | 0.65 | 0.65 | 0.65 | 0.65 |
| Penambahan H air akibat sabo | 0.02 | 4.73 | 5.40 | 4.99 | 4.68 |

| Hasil Data | 15 | 20 | 25 | 30 | 35 |
|---|---|---|---|---|---|
| Elevasi rata rata | 22.13 | 22.29 | 22.59 | 23.22 | 23.3 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 4.95 | 4.79 | 4.49 | 3.86 | 3.78 |
| Elevasi air tanpa sabo Q 85 | 26.43 | 26.43 | 26.43 | 26.43 | 26.43 |
| h air normal | 0.65 | 0.65 | 0.65 | 0.65 | 0.65 |
| Penambahan H air akibat sabo | 4.30 | 4.14 | 3.84 | 3.21 | 3.13 |

| Hasil Data | 40 | 45 | 65 | 70 | 75 |
|---|---|---|---|---|---|
| Elevasi rata rata | 23.66 | 23.66 | 25.26 | 26.1 | 26.1 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 3.42 | 3.42 | 1.82 | 0.98 | 0.98 |
| Elevasi air tanpa sabo Q 85 | 26.43 | 26.43 | 26.43 | 26.43 | 26.43 |
| h air normal | 0.65 | 0.65 | 0.65 | 0.65 | 0.65 |
| Penambahan H air akibat sabo | 2.77 | 2.77 | 1.17 | 0.33 | 0.33 |

| Hasil Data | 80 | 85 | 90 | 95 | 100 |
|---|---|---|---|---|---|
| Elevasi rata rata | 26.28 | 26.28 | 26.27 | | 27.49 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | | 27.08 |
| H air | 0.8 | 0.8 | 0.81 | | -0.41 |
| Elevasi air tanpa sabo Q 85 | 26.43 | 26.43 | 26.43 | | 26.43 |
| h air normal | 0.65 | 0.65 | 0.65 | | 0.65 |
| Penambahan H air akibat sabo | 0.15 | 0.15 | 0.16 | | -1.06 |

| Hasil Data | 115 | 120 | 125 | 130 | 135 |
|---|---|---|---|---|---|
| Elevasi rata rata | 28.49 | 28.49 | 28.59 | 28.64 | 29.15 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | -1.41 | -1.41 | -1.51 | -1.56 | -2.07 |
| Elevasi air tanpa sabo Q 85 | 26.43 | 26.43 | 26.43 | 26.43 | 26.43 |
| h air normal | 0.65 | 0.65 | 0.65 | 0.65 | 0.65 |
| Penambahan H air akibat sabo | -2.06 | -2.06 | -2.16 | -2.21 | -2.72 |

| Hasil Data | 140 | 145 |
|---|---|---|
| Elevasi rata rata | 29.15 | |
| Elevasi dasar fluem | 27.08 | |
| H air | -2.07 | |
| Elevasi air tanpa sabo Q 85 | 26.43 | |
| h air normal | 0.65 | |
| Penambahan H air akibat sabo | -2.72 | |

Tabel hasil pengukuran debit sebelum pengukuran

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 5.35 | 15.2 | 2 | 13.2 | 82.24 |
| no. 2 (t = 90 detik ) | 6.27 | 18 | 2 | 16 | 85.06 |

Tabel hasil pengukuran debit setelah pengukuran

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 4.8 | 14.2 | 2 | 12.2 | 84.72 |
| no. 2 (t = 90 detik ) | 5.48 | 17 | 2 | 15 | 91.24 |

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 5.88 | 17 | 2 | 15 | 85.03 |
| no. 2 (t = 90 detik ) | 6.27 | 18 | 2 | 16 | 85.06 |

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 5.14 | 15 | 2 | 13 | 84.31 |
| no. 2 (t = 90 detik ) | 6.32 | 18.2 | 2 | 16.2 | 85.44 |

Tabel Pengukuran elevasi dasar saluran dengan point gage

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | 27.45 | 28.5 | 28.4 | 28.5 | 27.58 | 27.58 | 27.48 |
| 22.5 | 27.4 | 28.57 | 28.55 | 28.15 | 27.44 | 27.4 | 27.35 |
| 15 | 28.52 | 28.22 | 28.4 | 28.25 | 27.3 | 27.35 | 27.33 |
| 7.5 | 28.31 | 28.3 | 28.51 | 27.5 | 27.68 | 27.6 | 27.58 |
| 1.2 | 28.42 | 28.5 | 28.63 | 27.4 | 27.42 | 27.42 | 27.42 |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | 27.58 | 27.41 | 25.42 | 26.43 | 27.43 | 26.42 | 27.22 | 27.22 |
| 22.5 | 27.44 | 24.42 | 26.52 | 25.32 | 27.35 | 27.44 | 27.41 | 27.44 |
| 15 | 27.3 | 25.41 | 27.41 | 26.41 | 26.53 | 26.43 | 27.33 | 27.33 |
| 7.5 | 27.68 | 26.35 | 26.44 | 26.45 | 27.31 | 26.55 | 26.32 | 26.32 |
| 1.2 | 27.42 | 27.47 | 27.32 | 27.32 | 27.22 | 27.21 | 26.46 | 25.46 |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | 27.33 | 26.34 | 27.25 | 27.54 | 27.56 | 26.43 | |
| 22.5 | 27.34 | 26.43 | 27.54 | 27.34 | 26.58 | 27.49 | |
| 15 | 26.44 | 27.32 | 27.23 | 27.52 | 26.53 | 27.41 | |
| 7.5 | 26.41 | 26.32 | 28.45 | 25.53 | 25.45 | 25.51 | |
| 1.2 | 23.46 | 25.42 | 25.5 | 26.57 | 26.59 | 27.59 | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | 26.58 | 24.58 | 24.54 | 24.45 | 23.43 | 23.41 | 24.00 | |
| 22.5 | 23.55 | 23.55 | 23.43 | 24.42 | 23.46 | 24.41 | 24.41 | |
| 15 | 24.59 | 23.59 | 24.57 | 23.57 | 24.41 | 23.54 | 24.43 | |
| 7.5 | 25.44 | 25.44 | 25.57 | 25.41 | 25.48 | 26.49 | 27.57 | |
| 1.2 | 27.49 | 27.49 | 28.49 | 27.46 | 27.49 | 27.22 | 28.48 | |

Tabel kenaikan elevasi dasar sungai

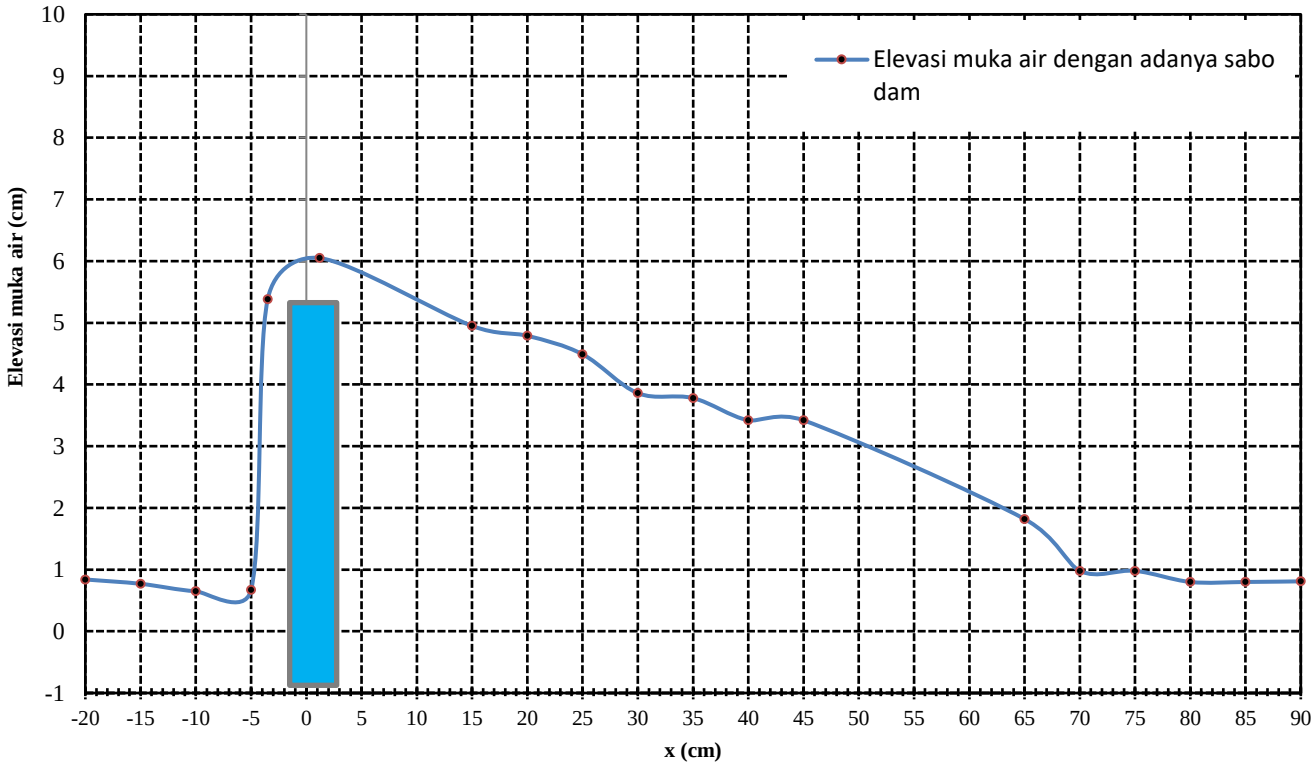
| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | -0.37 | -1.42 | -1.32 | -1.42 | -0.50 | -0.50 | -0.40 |
| 22.5 | -0.32 | -1.49 | -1.47 | -1.07 | -0.36 | -0.32 | -0.27 |
| 15 | -1.44 | -1.14 | -1.32 | -1.17 | -0.22 | -0.27 | -0.25 |
| 7.5 | -1.23 | -1.22 | -1.43 | -0.42 | -0.60 | -0.52 | -0.50 |
| 1.2 | -1.34 | -1.42 | -1.55 | -0.32 | -0.34 | -0.34 | -0.34 |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | -0.50 | -0.33 | 1.66 | 0.65 | -0.35 | 0.66 | -0.14 | -0.14 |
| 22.5 | -0.36 | 2.66 | 0.56 | 1.76 | -0.27 | -0.36 | -0.33 | -0.36 |
| 15 | -0.22 | 1.67 | -0.33 | 0.67 | 0.55 | 0.65 | -0.25 | -0.25 |
| 7.5 | -0.60 | 0.73 | 0.64 | 0.63 | -0.23 | 0.53 | 0.76 | 0.76 |
| 1.2 | -0.34 | -0.39 | -0.24 | -0.24 | -0.14 | -0.13 | 0.62 | 1.62 |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | -0.25 | 0.74 | -0.17 | -0.46 | -0.48 | 0.65 | |
| 22.5 | -0.26 | 0.65 | -0.46 | -0.26 | 0.50 | -0.41 | |
| 15 | 0.64 | -0.24 | -0.15 | -0.44 | 0.55 | -0.33 | |
| 7.5 | 0.67 | 0.76 | -1.37 | 1.55 | 1.63 | 1.57 | |
| 1.2 | 3.62 | 1.66 | 1.58 | 0.51 | 0.49 | -0.51 | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | 0.50 | 2.50 | 2.54 | 2.63 | 3.65 | 3.67 | 3.08 | |
| 22.5 | 3.53 | 3.53 | 3.65 | 2.66 | 3.62 | 2.67 | 2.67 | |
| 15 | 2.49 | 3.49 | 2.51 | 3.51 | 2.67 | 3.54 | 2.65 | |
| 7.5 | 1.64 | 1.64 | 1.51 | 1.67 | 1.60 | 0.59 | -0.49 | |
| 1.2 | -0.41 | -0.41 | -1.41 | -0.38 | -0.41 | -0.14 | -1.40 | |

# GRAFIK KENAIKAN ELEVASI MUKA AIR



**LABORATORIUM HIDROLIKA**
**JURUSAN TEKNIS SIPIL**
**UNIVERSITAS MUHAMMADIYAH MATARAM**

# EKSPERIMEN (3)

HARI/TANGGAL

JUMLAH KAYU : 120 BIJI

DEBIT : 116 $cm^2$/sec

**LABORATORIUM HIDROLIKA**
**JURUSAN TEKNIS SIPIL**
**UNIVERSITAS MUHAMMADIYAH MATARAM**
**2021**

**Eksperimen** : **3**

**debit (q)** : **116 m²/sec**

**jumlah kayu** :

| No Eksperimen | Ukuran Batang (cm) | Jumlah batang |
|---|---|---|
| | 7.5 | |
| 3 | 120 | 120 |

**waktu** : **40 sec**

**diameter kayu** : **6 mm**

**Posisi kayu** : **hulu** : 28

**hilir** : 0

**sabo** : 3

**lolos** : 89

∑ = 120

Tabel Pengukuran elevasi muka air dengan point gage

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | | | | | | | |
| 22.5 | | | | | | | |
| 15 | 26.02 | 25.61 | 25.38 | 25.7 | 23.44 | 21.13 | 21.22 |
| 7.5 | | | | | | | |
| 1.2 | | | | | | | |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | |
| 22.5 | | | | | | | | |
| 15 | 22.31 | 23.21 | 23.16 | 23.43 | 24.42 | 24.17 | 25.24 | 25.12 |
| 7.5 | | | | | | | | |
| 1.2 | | | | | | | | |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | | | | | | | |
| 22.5 | | | | | | | |
| 15 | 26.02 | 25.41 | 25.45 | 25.64 | 25.65 | 25.65 | |
| 7.5 | | | | | | | |
| 1.2 | | | | | | | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | |
| 22.5 | | | | | | | | |
| 15 | 28.4 | 29.33 | 29.17 | 29.4 | 29.46 | 29.2 | 29.24 | |
| 7.5 | | | | | | | | |
| 1.2 | | | | | | | | |

Tabel Elevasi tinggi muka air  tertahan

| Hasil Data | -20 | -15 | -10 |
|---|---|---|---|
| Elevasi rata rata | 26.02 | 25.61 | 25.38 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 |
| H air | 1.06 | 1.47 | 1.7 |
| Elevasi air tanpa sabo Q 116 | 26.02 | 26.02 | 26.02 |
| h air normal | 1.06 | 1.06 | 1.06 |
| Penambahan H air akibat sabo | 0.00 | 0.41 | 0.64 |

| Hasil Data | -5 | -3.5 | 1.2 | 5 | 10 |
|---|---|---|---|---|---|
| Elevasi rata rata | 25.7 | 23.44 | 21.13 | 21.22 | 22.31 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 1.38 | 3.64 | 5.95 | 5.86 | 4.77 |
| Elevasi air tanpa sabo Q 116 | 26.02 | 26.02 | 26.02 | 26.02 | 26.02 |
| h air normal | 1.06 | 1.06 | 1.06 | 1.06 | 1.06 |
| Penambahan H air akibat sabo | 0.32 | 2.58 | 4.89 | 4.80 | 3.71 |

| Hasil Data | 15 | 20 | 25 | 30 | 35 |
|---|---|---|---|---|---|
| Elevasi rata rata | 23.21 | 23.16 | 23.43 | 24.42 | 24.17 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 3.87 | 3.92 | 3.65 | 2.66 | 2.91 |
| Elevasi air tanpa sabo Q 116 | 26.02 | 26.02 | 26.02 | 26.02 | 26.02 |
| h air normal | 1.06 | 1.06 | 1.06 | 1.06 | 1.06 |
| Penambahan H air akibat sabo | 2.81 | 2.86 | 2.59 | 1.60 | 1.85 |

| Hasil Data | 40 | 45 | 65 | 70 | 75 |
|---|---|---|---|---|---|
| Elevasi rata rata | 25.24 | 25.12 | 26.02 | 25.41 | 25.45 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 1.84 | 1.96 | 1.06 | 1.67 | 1.63 |
| Elevasi air tanpa sabo Q 116 | 26.02 | 26.02 | 26.02 | 26.02 | 26.02 |
| h air normal | 1.06 | 1.06 | 1.06 | 1.06 | 1.06 |
| Penambahan H air akibat sabo | 0.78 | 0.90 | 0.00 | 0.61 | 0.57 |

| Hasil Data | 80 | 85 | 90 | 95 | 100 |
|---|---|---|---|---|---|
| Elevasi rata rata | 25.64 | 25.65 | 25.65 | | 28.4 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | | 27.08 |
| H air | 1.44 | 1.43 | 1.43 | | -1.32 |
| Elevasi air tanpa sabo Q 116 | 26.02 | 26.02 | 26.02 | | 26.02 |
| h air normal | 1.06 | 1.06 | 1.06 | | 1.06 |
| Penambahan H air akibat sabo | 0.38 | 0.37 | 0.37 | | -2.38 |

| Hasil Data | 115 | 120 | 125 | 130 | 135 |
|---|---|---|---|---|---|
| Elevasi rata rata | 29.33 | 29.17 | 29.4 | 29.46 | 29.2 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | -2.25 | -2.09 | -2.32 | -2.38 | -2.12 |
| Elevasi air tanpa sabo Q 116 | 26.02 | 26.02 | 26.02 | 26.02 | 26.02 |
| h air normal | 1.06 | 1.06 | 1.06 | 1.06 | 1.06 |
| Penambahan H air akibat sabo | -3.31 | -3.15 | -3.38 | -3.44 | -3.18 |

| Hasil Data | 140 | 145 |
|---|---|---|
| Elevasi rata rata | 29.24 | |
| Elevasi dasar fluem | 27.08 | |
| H air | -2.16 | |
| Elevasi air tanpa sabo Q 116 | 26.02 | |
| h air normal | 1.06 | |
| Penambahan H air akibat sabo | -3.22 | |

Tabel hasil pengukuran debit sebelum pengukuran

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( $cm^2/s$ ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.27 | 10 | 2 | 8 | 117.47 |
| no. 2 (t = 90 detik ) | 2.2 | 9 | 2 | 7 | 106.06 |

Tabel hasil pengukuran debit setelah pengukuran

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( $cm^2/s$ ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.23 | 10 | 2 | 8 | 119.58 |
| no. 2 (t = 90 detik ) | 2.25 | 10 | 2 | 8 | 118.52 |

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.23 | 10 | 2 | 8 | 119.58 |
| no. 2 (t = 90 detik ) | 2.28 | 10 | 2 | 8 | 116.96 |

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.24 | 10 | 2 | 8 | 119.05 |
| no. 2 (t = 90 detik ) | 2.25 | 10 | 2 | 8 | 118.52 |

Tabel Pengukuran elevasi dasar saluran dengan point gage

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | 27.54 | 27.54 | 28.31 | 28.38 | 27.01 | 22.34 | 24.73 |
| 22.5 | 27.43 | 28.33 | 28.05 | 28.08 | 28.11 | 23.14 | 25.36 |
| 15 | 28.55 | 28.86 | 29.16 | 28.51 | 27.48 | 24.05 | 27.07 |
| 7.5 | 28.03 | 27.96 | 28.32 | 28.37 | 27.59 | 22.62 | 26.35 |
| 1.2 | 28.41 | 28.27 | 28.09 | 28.21 | 27.1 | 22.75 | 28.24 |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | 26.04 | 26.42 | 26.04 | 26.92 | 25.91 | 27.24 | 27.32 | 27.51 |
| 22.5 | 26.61 | 27.04 | 25.89 | 26.91 | 26.61 | 27.22 | 28.57 | 28.47 |
| 15 | 26.35 | 26.22 | 26.47 | 26.35 | 27.81 | 27.52 | 27.39 | 28.02 |
| 7.5 | 24.65 | 24.65 | 25.73 | 25.96 | 27.69 | 27.11 | 27.27 | 28.56 |
| 1.2 | 27.27 | 27.27 | 27.22 | 27.34 | 27.43 | 27.12 | 27.23 | 27.44 |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | 27.39 | 27.21 | 27.43 | 26.45 | 24.12 | 24.23 | |
| 22.5 | 27.44 | 26.42 | 27.06 | 26.45 | 24.53 | 24.43 | |
| 15 | 27.03 | 27.39 | 26.33 | 26.47 | 25.12 | 26.31 | |
| 7.5 | 26.54 | 27.69 | 25.47 | 25.02 | 24.44 | 25.45 | |
| 1.2 | 27.57 | 26.04 | 25.57 | 24.22 | 24.57 | 25.65 | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | 24.28 | 24.41 | 25.31 | 25.12 | 25.44 | 25.28 | 27.35 | |
| 22.5 | 24.04 | 25.44 | 24.22 | 24.22 | 25.14 | 25.24 | 25.13 | |
| 15 | 26.24 | 27.21 | 27.06 | 26.07 | 27.11 | 28.04 | 28.52 | |
| 7.5 | 25.32 | 25.22 | 26.46 | 25.14 | 26.33 | 26.33 | 27.12 | |
| 1.2 | 24.21 | 24.07 | 25.14 | 24.41 | 26.04 | 26.23 | 27.47 | |

Tabel kenaikan elevasi dasar sungai

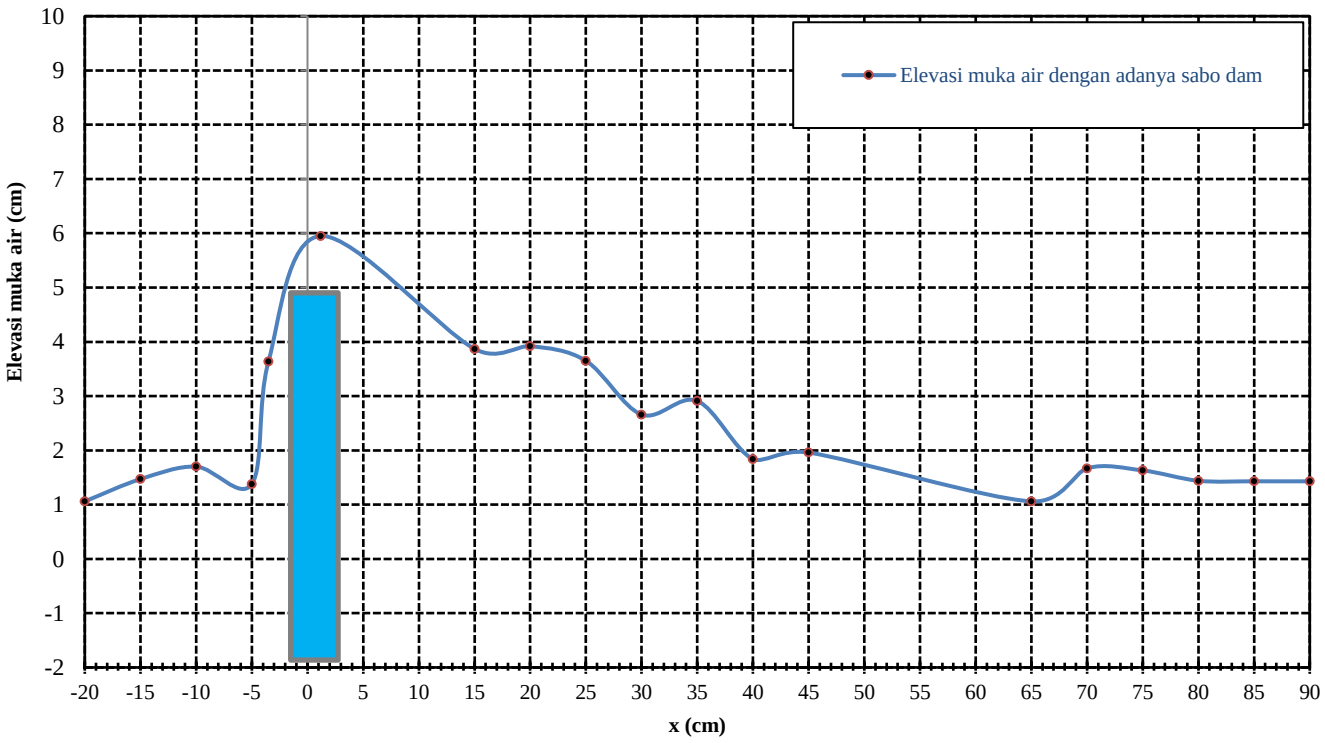
| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | -0.46 | -0.46 | -1.23 | -1.30 | 0.07 | 4.74 | 2.35 |
| 22.5 | -0.35 | -1.25 | -0.97 | -1.00 | -1.03 | 3.94 | 1.72 |
| 15 | -1.47 | -1.78 | -2.08 | -1.43 | -0.40 | 3.03 | 0.01 |
| 7.5 | -0.95 | -0.88 | -1.24 | -1.29 | -0.51 | 4.46 | 0.73 |
| 1.2 | -1.33 | -1.19 | -1.01 | -1.13 | -0.02 | 4.33 | -1.16 |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | 1.04 | 0.66 | 1.04 | 0.16 | 1.17 | -0.16 | -0.24 | -0.43 |
| 22.5 | 0.47 | 0.04 | 1.19 | 0.17 | 0.47 | -0.14 | -1.49 | -1.39 |
| 15 | 0.73 | 0.86 | 0.61 | 0.73 | -0.73 | -0.44 | -0.31 | -0.94 |
| 7.5 | 2.43 | 2.43 | 1.35 | 1.12 | -0.61 | -0.03 | -0.19 | -1.48 |
| 1.2 | -0.19 | -0.19 | -0.14 | -0.26 | -0.35 | -0.04 | -0.15 | -0.36 |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | -0.31 | -0.13 | -0.35 | 0.63 | 2.96 | 2.85 | |
| 22.5 | -0.36 | 0.66 | 0.02 | 0.63 | 2.55 | 2.65 | |
| 15 | 0.05 | -0.31 | 0.75 | 0.61 | 1.96 | 0.77 | |
| 7.5 | 0.54 | -0.61 | 1.61 | 2.06 | 2.64 | 1.63 | |
| 1.2 | -0.49 | 1.04 | 1.51 | 2.86 | 2.51 | 1.43 | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | 2.80 | 2.67 | 1.77 | 1.96 | 1.64 | 1.80 | -0.27 | |
| 22.5 | 3.04 | 1.64 | 2.86 | 2.86 | 1.94 | 1.84 | 1.95 | |
| 15 | 0.84 | -0.13 | 0.02 | 1.01 | -0.03 | -0.96 | -1.44 | |
| 7.5 | 1.76 | 1.86 | 0.62 | 1.94 | 0.75 | 0.75 | -0.04 | |
| 1.2 | 2.87 | 3.01 | 1.94 | 2.67 | 1.04 | 0.85 | -0.39 | |

# GRAFIK KENAIKAN ELEVASI MUKA AIR



**LABORATORIUM HIDROLIKA**
**JURUSAN TEKNIS SIPIL**
**UNIVERSITAS MUHAMMADIYAH MATARAM**

# EKSPERIMEN (4)

HARI/TANGGAL

JUMLAH KAYU : 120 BIJI

DEBIT : 122 $cm^2$/sec

**LABORATORIUM HIDROLIKA**
**JURUSAN TEKNIS SIPIL**
**UNIVERSITAS MUHAMMADIYAH MATARAM**
**2021**

**Eksperimen** : **4**
**debit (q)** : **122 m²/sec**

**jumlah kayu** :

| No Eksperimen | Ukuran Batang (cm) | Jumlah batang |
|---|---|---|
| | 7.5 | |
| 4 | 120 | 120 |

**waktu** : **37.58 sec**
**diameter kayu** : **6 mm**

**Posisi kayu** :

| | | |
|---|---|---|
| **hulu** | : | 29 |
| **hilir** | : | 0 |
| **sabo** | : | 2 |
| **lolos** | : | 89 |
| | ∑ = | 120 |

Tabel Pengukuran elevasi muka air dengan point gage

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | | | | | | | |
| 22.5 | | | | | | | |
| 15 | 25.89 | 25.83 | 25.75 | 25.7 | 23.71 | 20.14 | 20.68 |
| 7.5 | | | | | | | |
| 1.2 | | | | | | | |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | |
| 22.5 | | | | | | | | |
| 15 | 22.01 | 23.21 | 23.79 | 24.06 | 24.31 | 24.78 | 25.01 | 25.51 |
| 7.5 | | | | | | | | |
| 1.2 | | | | | | | | |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | | | | | | | |
| 22.5 | | | | | | | |
| 15 | 25.7 | 25.75 | 25.77 | 25.55 | 25.5 | 25.65 | |
| 7.5 | | | | | | | |
| 1.2 | | | | | | | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | |
| 22.5 | | | | | | | | |
| 15 | 28.94 | 29.23 | 29.24 | 29.37 | 29.15 | 29.36 | 29.51 | |
| 7.5 | | | | | | | | |
| 1.2 | | | | | | | | |

Tabel Elevasi tinggi muka air  tertahan

| Hasil Data | -20 | -15 | -10 |
|---|---|---|---|
| Elevasi rata rata | 25.89 | 25.83 | 25.75 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 |
| H air | 1.19 | 1.25 | 1.33 |
| Elevasi air tanpa sabo Q 122 | 25.85 | 25.85 | 25.85 |
| h air normal | 1.23 | 1.23 | 1.23 |
| Penambahan H air akibat sabo | -0.04 | 0.02 | 0.10 |

| Hasil Data | -5 | -3.5 | 1.2 | 5 | 10 |
|---|---|---|---|---|---|
| Elevasi rata rata | 25.7 | 23.71 | 20.14 | 20.68 | 22.01 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 1.38 | 3.37 | 6.94 | 6.4 | 5.07 |
| Elevasi air tanpa sabo Q 122 | 25.85 | 25.85 | 25.85 | 25.85 | 25.85 |
| h air normal | 1.23 | 1.23 | 1.23 | 1.23 | 1.23 |
| Penambahan H air akibat sabo | 0.15 | 2.14 | 5.71 | 5.17 | 3.84 |

| Hasil Data | 15 | 20 | 25 | 30 | 35 |
|---|---|---|---|---|---|
| Elevasi rata rata | 23.21 | 23.79 | 24.06 | 24.31 | 24.78 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 3.87 | 3.29 | 3.02 | 2.77 | 2.3 |
| Elevasi air tanpa sabo Q 122 | 25.85 | 25.85 | 25.85 | 25.85 | 25.85 |
| h air normal | 1.23 | 1.23 | 1.23 | 1.23 | 1.23 |
| Penambahan H air akibat sabo | 2.64 | 2.06 | 1.79 | 1.54 | 1.07 |

| Hasil Data | 40 | 45 | 65 | 70 | 75 |
|---|---|---|---|---|---|
| Elevasi rata rata | 25.01 | 25.51 | 25.7 | 25.75 | 25.77 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 2.07 | 1.57 | 1.38 | 1.33 | 1.31 |
| Elevasi air tanpa sabo Q 122 | 25.85 | 25.85 | 25.85 | 25.85 | 25.85 |
| h air normal | 1.23 | 1.23 | 1.23 | 1.23 | 1.23 |
| Penambahan H air akibat sabo | 0.84 | 0.34 | 0.15 | 0.10 | 0.08 |

| Hasil Data | 80 | 85 | 90 | 95 | 100 |
|---|---|---|---|---|---|
| Elevasi rata rata | 25.55 | 25.5 | 25.65 | | 28.94 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | | 27.08 |
| H air | 1.53 | 1.58 | 1.43 | | -1.86 |
| Elevasi air tanpa sabo Q 122 | 25.85 | 25.85 | 25.85 | | 25.85 |
| h air normal | 1.23 | 1.23 | 1.23 | | 1.23 |
| Penambahan H air akibat sabo | 0.30 | 0.35 | 0.20 | | -3.09 |

| Hasil Data | 115 | 120 | 125 | 130 | 135 |
|---|---|---|---|---|---|
| Elevasi rata rata | 29.23 | 29.24 | 29.37 | 29.15 | 29.36 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | -2.15 | -2.16 | -2.29 | -2.07 | -2.28 |
| Elevasi air tanpa sabo Q 122 | 25.85 | 25.85 | 25.85 | 25.85 | 25.85 |
| h air normal | 1.23 | 1.23 | 1.23 | 1.23 | 1.23 |
| Penambahan H air akibat sabo | -3.38 | -3.39 | -3.52 | -3.30 | -3.51 |

| Hasil Data | 140 | 145 |
|---|---|---|
| Elevasi rata rata | 29.51 | |
| Elevasi dasar fluem | 27.08 | |
| H air | -2.43 | |
| Elevasi air tanpa sabo Q 122 | 25.85 | |
| h air normal | 1.23 | |
| Penambahan H air akibat sabo | -3.66 | |

Tabel hasil pengukuran debit sebelum pengukuran

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.52 | 10.5 | 2 | 8.5 | 112.43 |
| no. 2 (t = 90 detik ) | 2.7 | 12 | 2 | 10 | 123.46 |

Tabel hasil pengukuran debit saat pengukuran

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.52 | 12 | 2 | 10 | 132.28 |
| no. 2 (t = 90 detik ) | 2.7 | 11 | 2 | 9 | 111.11 |

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.23 | 10.5 | 2 | 8.5 | 127.06 |
| no. 2 (t = 90 detik ) | 2.34 | 11 | 2 | 9 | 128.21 |

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.51 | 11 | 2 | 9 | 119.52 |
| no. 2 (t = 90 detik ) | 2.59 | 12 | 2 | 10 | 128.70 |

Tabel Pengukuran elevasi dasar saluran dengan point gage

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | 27.54 | 27.29 | 27.36 | 27.85 | 27.68 | 22.64 | 24.6 |
| 22.5 | 27.7 | 28.15 | 27.94 | 27.6 | 27.15 | 22.97 | 25.4 |
| 15 | 28.41 | 28.84 | 28 | 28.36 | 27.41 | 23.49 | 25.68 |
| 7.5 | 28.04 | 27.98 | 28.03 | 28.21 | 27.58 | 22.2 | 27.76 |
| 1.2 | 28.25 | 27.9 | 28.05 | 28.33 | 28.16 | 22.47 | 28.44 |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | 27.09 | 26.83 | 27.54 | 27.18 | 27 | 27.07 | 27.42 | 27.66 |
| 22.5 | 25.05 | 26.81 | 27.27 | 27.41 | 26.71 | 27.45 | 27.56 | 27.62 |
| 15 | 26.1 | 25.74 | 25.75 | 27.03 | 26.89 | 27.41 | 27.86 | 28.7 |
| 7.5 | 27.69 | 27.82 | 26.7 | 26.69 | 25.67 | 25.88 | 27.89 | 26 |
| 1.2 | 27.49 | 27.71 | 27.64 | 26.72 | 24.94 | 26.87 | 27.6 | 27.55 |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | 27.06 | 27.11 | 24.52 | 25.51 | 24.47 | 23.25 | |
| 22.5 | 27.26 | 27.33 | 26.45 | 23.32 | 23.13 | 23.44 | |
| 15 | 27.01 | 26.37 | 26.34 | 26.47 | 24.31 | 24.38 | |
| 7.5 | 26.02 | 26.41 | 26.11 | 26.02 | 24.36 | 24.31 | |
| 1.2 | 27.34 | 27.21 | 27.25 | 28.26 | 28.39 | 27.26 | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | 24.52 | 24.25 | 24.17 | 25.65 | 24.25 | 25.16 | 27.27 | |
| 22.5 | 23.37 | 24.22 | 25.32 | 24.13 | 25.13 | 26.51 | 26.29 | |
| 15 | 24.04 | 25.18 | 25.43 | 26.29 | 25.13 | 26.17 | 26.12 | |
| 7.5 | 25.02 | 25.32 | 26.23 | 26.15 | 24.46 | 25.53 | 25.27 | |
| 1.2 | 28.32 | 27.26 | 26.38 | 27.24 | 26.34 | 26.42 | 26.11 | |

Tabel kenaikan elevasi dasar sungai

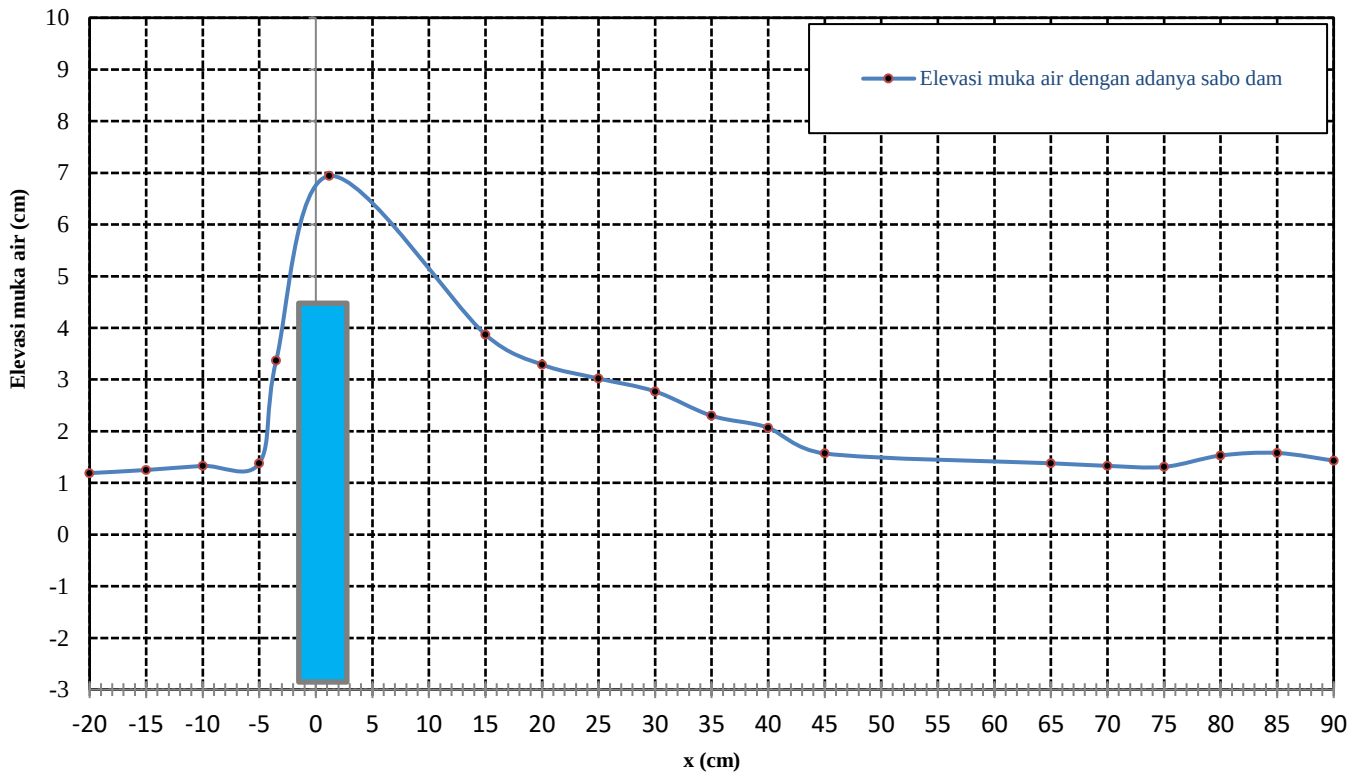
| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | -0.46 | -0.21 | -0.28 | -0.77 | -0.60 | 4.44 | 2.48 |
| 22.5 | -0.62 | -1.07 | -0.86 | -0.52 | -0.07 | 4.11 | 1.68 |
| 15 | -1.33 | -1.76 | -0.92 | -1.28 | -0.33 | 3.59 | 1.40 |
| 7.5 | -0.96 | -0.90 | -0.95 | -1.13 | -0.50 | 4.88 | -0.68 |
| 1.2 | -1.17 | -0.82 | -0.97 | -1.25 | -1.08 | 4.61 | -1.36 |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | -0.01 | 0.25 | -0.46 | -0.10 | 0.08 | 0.01 | -0.34 | -0.58 |
| 22.5 | 2.03 | 0.27 | -0.19 | -0.33 | 0.37 | -0.37 | -0.48 | -0.54 |
| 15 | 0.98 | 1.34 | 1.33 | 0.05 | 0.19 | -0.33 | -0.78 | -1.62 |
| 7.5 | -0.61 | -0.74 | 0.38 | 0.39 | 1.41 | 1.20 | -0.81 | 1.08 |
| 1.2 | -0.41 | -0.63 | -0.56 | 0.36 | 2.14 | 0.21 | -0.52 | -0.47 |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | 0.02 | -0.03 | 2.56 | 1.57 | 2.61 | 3.83 | |
| 22.5 | -0.18 | -0.25 | 0.63 | 3.76 | 3.95 | 3.64 | |
| 15 | 0.07 | 0.71 | 0.74 | 0.61 | 2.77 | 2.70 | |
| 7.5 | 1.06 | 0.67 | 0.97 | 1.06 | 2.72 | 2.77 | |
| 1.2 | -0.26 | -0.13 | -0.17 | -1.18 | -1.31 | -0.18 | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | 2.56 | 2.83 | 2.91 | 1.43 | 2.83 | 1.92 | -0.19 | |
| 22.5 | 3.71 | 2.86 | 1.76 | 2.95 | 1.95 | 0.57 | 0.79 | |
| 15 | 3.04 | 1.90 | 1.65 | 0.79 | 1.95 | 0.91 | 0.96 | |
| 7.5 | 2.06 | 1.76 | 0.85 | 0.93 | 2.62 | 1.55 | 1.81 | |
| 1.2 | -1.24 | -0.18 | 0.70 | -0.16 | 0.74 | 0.66 | 0.97 | |

# GRAFIK KENAIKAN ELEVASI MUKA AIR



**LABORATORIUM HIDROLIKA**
**JURUSAN TEKNIS SIPIL**
**UNIVERSITAS MUHAMMADIYAH MATARAM**

# EKSPERIMEN (5)

HARI/TANGGAL

JUMLAH KAYU : 120 BIJI

DEBIT : 102 $cm^2$/sec

**LABORATORIUM HIDROLIKA**
**JURUSAN TEKNIS SIPIL**
**UNIVERSITAS MUHAMMADIYAH MATARAM**
**2021**

**Eksperimen** : **5**

**debit (q)** : **102 m²/sec**

**jumlah kayu** :

| No Eksperimen | Ukuran Batang (cm) | Jumlah batang |
|---|---|---|
| | 7.5 | |
| 5 | 120 | 120 |

**waktu** : **38 sec**

**diameter kayu** : **5 mm**

**Posisi kayu** : **hulu** : 8

**hilir** : 0

**sabo** : 2

**lolos** : 110

∑ = 120

Tabel Pengukuran elevasi muka air dengan point gage

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | | | | | | | |
| 22.5 | | | | | | | |
| 15 | 25.23 | 25.49 | 25 | 25.04 | 22.17 | 21.03 | 21.44 |
| 7.5 | | | | | | | |
| 1.2 | | | | | | | |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | |
| 22.5 | | | | | | | | |
| 15 | 21.54 | 22.13 | 22.29 | 22.59 | 23.22 | 23.3 | 23.66 | 23.66 |
| 7.5 | | | | | | | | |
| 1.2 | | | | | | | | |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | | | | | | | |
| 22.5 | | | | | | | |
| 15 | 25.26 | 25.1 | 25.1 | 25.28 | 25.34 | 25.35 | |
| 7.5 | | | | | | | |
| 1.2 | | | | | | | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | |
| 22.5 | | | | | | | | |
| 15 | 27.49 | 28.49 | 28.49 | 28.59 | 28.64 | 29.15 | 29.15 | |
| 7.5 | | | | | | | | |
| 1.2 | | | | | | | | |

Tabel Elevasi tinggi muka air  tertahan

| Hasil Data | -20 | -15 | -10 |
|---|---|---|---|
| Elevasi rata rata | 25.23 | 25.49 | 25 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 |
| H air | 1.85 | 1.59 | 2.08 |
| Elevasi air tanpa sabo Q 102 | 26.02 | 26.02 | 26.02 |
| h air normal | 1.06 | 1.06 | 1.06 |
| Penambahan H air akibat sabo | 0.79 | 0.53 | 1.02 |

| Hasil Data | -5 | -3.5 | 1.2 | 5 | 10 |
|---|---|---|---|---|---|
| Elevasi rata rata | 25.04 | 22.17 | 21.03 | 21.44 | 21.54 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 2.04 | 4.91 | 6.05 | 5.64 | 5.54 |
| Elevasi air tanpa sabo Q 102 | 26.02 | 26.02 | 26.02 | 26.02 | 26.02 |
| h air normal | 1.06 | 1.06 | 1.06 | 1.06 | 1.06 |
| Penambahan H air akibat sabo | 0.98 | 3.85 | 4.99 | 4.58 | 4.48 |

| Hasil Data | 15 | 20 | 25 | 30 | 35 |
|---|---|---|---|---|---|
| Elevasi rata rata | 22.13 | 22.29 | 22.59 | 23.22 | 23.3 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 4.95 | 4.79 | 4.49 | 3.86 | 3.78 |
| Elevasi air tanpa sabo Q 102 | 26.02 | 26.02 | 26.02 | 26.02 | 26.02 |
| h air normal | 1.06 | 1.06 | 1.06 | 1.06 | 1.06 |
| Penambahan H air akibat sabo | 3.89 | 3.73 | 3.43 | 2.80 | 2.72 |

| Hasil Data | 40 | 45 | 65 | 70 | 75 |
|---|---|---|---|---|---|
| Elevasi rata rata | 23.66 | 23.66 | 25.26 | 25.1 | 25.1 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 3.42 | 3.42 | 1.82 | 1.98 | 1.98 |
| Elevasi air tanpa sabo Q 102 | 26.02 | 26.02 | 26.02 | 26.02 | 26.02 |
| h air normal | 1.06 | 1.06 | 1.06 | 1.06 | 1.06 |
| Penambahan H air akibat sabo | 2.36 | 2.36 | 0.76 | 0.92 | 0.92 |

| Hasil Data | 80 | 85 | 90 | 95 | 100 |
|---|---|---|---|---|---|
| Elevasi rata rata | 25.28 | 25.34 | 25.35 | | 27.49 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | | 27.08 |
| H air | 1.8 | 1.74 | 1.73 | | -0.41 |
| Elevasi air tanpa sabo Q 102 | 26.02 | 26.02 | 26.02 | | 26.02 |
| h air normal | 1.06 | 1.06 | 1.06 | | 1.06 |
| Penambahan H air akibat sabo | 0.74 | 0.68 | 0.67 | | -1.47 |

| Hasil Data | 115 | 120 | 125 | 130 | 135 |
|---|---|---|---|---|---|
| Elevasi rata rata | 28.49 | 28.49 | 28.59 | 28.64 | 29.15 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | -1.41 | -1.41 | -1.51 | -1.56 | -2.07 |
| Elevasi air tanpa sabo Q 102 | 26.02 | 26.02 | 26.02 | 26.02 | 26.02 |
| h air normal | 1.06 | 1.06 | 1.06 | 1.06 | 1.06 |
| Penambahan H air akibat sabo | -2.47 | -2.47 | -2.57 | -2.62 | -3.13 |

| Hasil Data | 140 | 145 |
|---|---|---|
| Elevasi rata rata | 29.15 | |
| Elevasi dasar fluem | 27.08 | |
| H air | -2.07 | |
| Elevasi air tanpa sabo Q 102 | 26.02 | |
| h air normal | 1.06 | |
| Penambahan H air akibat sabo | -3.13 | |

Tabel hasil pengukuran debit sebelum pengukuran

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.86 | 11 | 2 | 9 | 104.90 |
| no. 2 (t = 90 detik ) | 2.57 | 10 | 2 | 8 | 103.76 |

Tabel hasil pengukuran debit saat pengukuran

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.31 | 9 | 2 | 7 | 101.01 |
| no. 2 (t = 90 detik ) | 2.28 | 9.5 | 2 | 7.5 | 109.65 |

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.39 | 9 | 2 | 7 | 97.63 |
| no. 2 (t = 90 detik ) | 2.69 | 10 | 2 | 8 | 99.13 |

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.71 | 10 | 2 | 8 | 98.40 |
| no. 2 (t = 90 detik ) | 2.63 | 10 | 2 | 8 | 101.39 |

Tabel Pengukuran elevasi dasar saluran dengan point gage

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | 27.5 | 27.47 | 27.53 | 26.4 | 27.4 | 27.41 | 27.32 |
| 22.5 | 27.41 | 28.31 | 27.41 | 27.31 | 25.3 | 25.3 | 26.32 |
| 15 | 29.1 | 29.32 | 28.51 | 28.41 | 26.17 | 26.17 | 26.37 |
| 7.5 | 28.3 | 25.1 | 28.3 | 27.43 | 28.38 | 28.38 | 27.31 |
| 1.2 | 28.54 | 28.24 | 28.11 | 28.52 | 29.32 | 29.32 | 28.37 |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | 26.33 | 27.44 | 27.43 | 27.34 | 26.46 | 27.46 | 27.59 | 27.44 |
| 22.5 | 26.44 | 27.32 | 25.32 | 26.49 | 27.54 | 26.32 | 27.45 | 27.41 |
| 15 | 26.44 | 26.33 | 26.41 | 27.49 | 26.44 | 27.43 | 27.44 | 28.52 |
| 7.5 | 26.43 | 26.31 | 26.37 | 26.41 | 26.34 | 26.46 | 27.51 | 26.42 |
| 1.2 | 27.42 | 27.36 | 28.48 | 27.47 | 28.47 | 26.33 | 27.47 | 27.52 |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | 26.32 | 27.43 | 27.36 | 26.44 | 27.4 | 27.34 | |
| 22.5 | 27.49 | 27.35 | 27.41 | 27.45 | 25.39 | 25.23 | |
| 15 | 28.34 | 27.34 | 26.49 | 26.4 | 24.4 | 24.22 | |
| 7.5 | 27.49 | 27.41 | 26.53 | 25.36 | 23.46 | 23.47 | |
| 1.2 | 27.35 | 27.45 | 26.51 | 25.4 | 25.49 | 25.12 | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | 26.41 | 25.41 | 26.4 | 26.11 | 26.21 | 26.4 | 27.24 | |
| 22.5 | 25.32 | 25.11 | 26.3 | 25.12 | 26.13 | 26.31 | 27.31 | |
| 15 | 24.32 | 25.22 | 25.12 | 25.34 | 28.21 | 26.44 | 27.42 | |
| 7.5 | 24.31 | 25.41 | 24.31 | 25.4 | 26.3 | 26.21 | 27.21 | |
| 1.2 | 25.33 | 25.2 | 25.17 | 26.33 | 26.21 | 27.34 | 27.31 | |

Tabel kenaikan elevasi dasar sungai

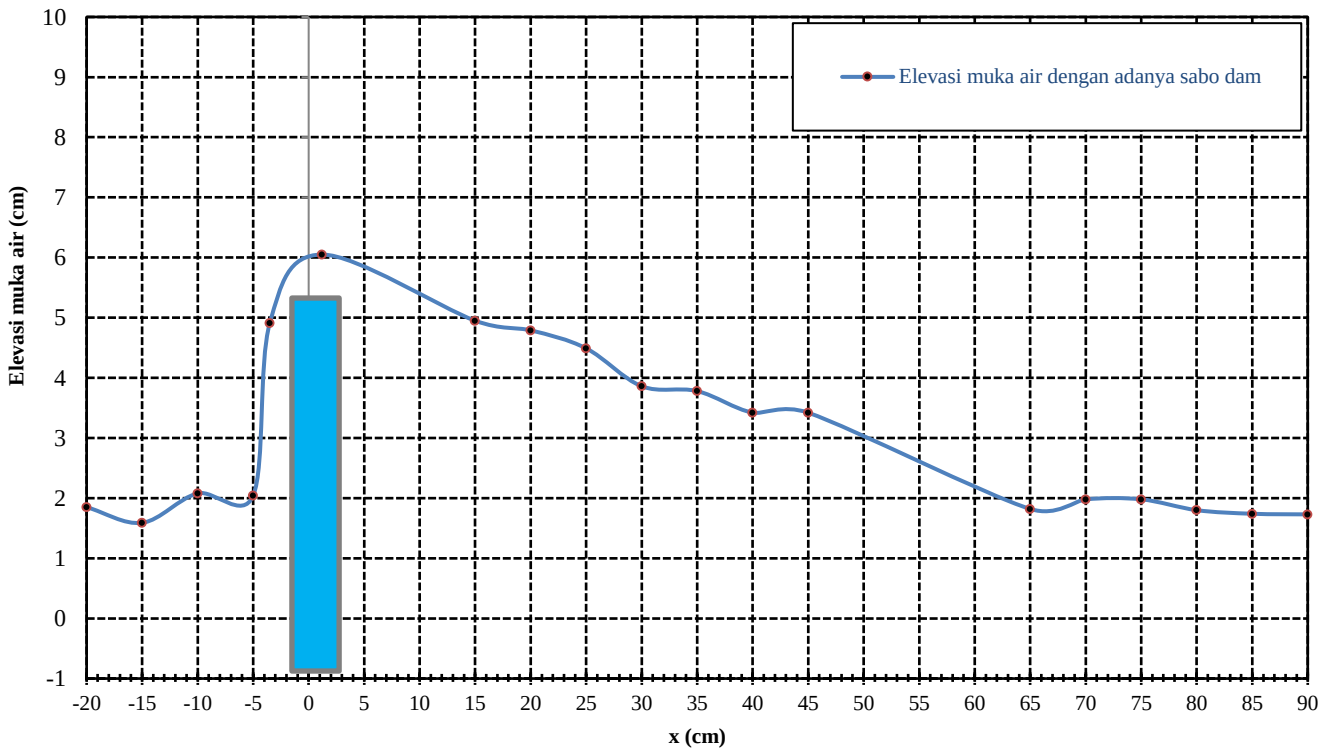
| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | -0.42 | -0.39 | -0.45 | 0.68 | -0.32 | -0.33 | -0.24 |
| 22.5 | -0.33 | -1.23 | -0.33 | -0.23 | 1.78 | 1.78 | 0.76 |
| 15 | -2.02 | -2.24 | -1.43 | -1.33 | 0.91 | 0.91 | 0.71 |
| 7.5 | -1.22 | 1.98 | -1.22 | -0.35 | -1.30 | -1.30 | -0.23 |
| 1.2 | -1.46 | -1.16 | -1.03 | -1.44 | -2.24 | -2.24 | -1.29 |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | 0.75 | -0.36 | -0.35 | -0.26 | 0.62 | -0.38 | 0.51 | 0.36 |
| 22.5 | 0.64 | -0.24 | 1.76 | 0.59 | -0.46 | 0.76 | 0.37 | 0.33 |
| 15 | 0.64 | 0.75 | 0.67 | -0.41 | 0.64 | -0.35 | 0.36 | 1.44 |
| 7.5 | 0.65 | 0.77 | 0.71 | 0.67 | 0.74 | 0.62 | 0.43 | -0.66 |
| 1.2 | -0.34 | -0.28 | -1.40 | -0.39 | -1.39 | 0.75 | 0.39 | 0.44 |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | 0.76 | 0.35 | -0.28 | 0.64 | -0.32 | -0.26 | |
| 22.5 | 0.41 | 0.27 | -0.33 | -0.37 | 1.69 | 1.85 | |
| 15 | 1.26 | 0.26 | 0.59 | 0.68 | 2.68 | 2.86 | |
| 7.5 | -0.41 | 0.33 | 0.55 | 1.72 | 3.62 | 3.61 | |
| 1.2 | -0.27 | 0.37 | 0.57 | 1.68 | 1.59 | 1.96 | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | 0.67 | 1.67 | 0.68 | 0.97 | 0.87 | 0.68 | -0.16 | |
| 22.5 | 1.76 | 1.97 | 0.78 | 1.96 | 0.95 | 0.77 | -0.23 | |
| 15 | 2.76 | 1.86 | 1.96 | 1.74 | -1.13 | 0.64 | -0.34 | |
| 7.5 | 2.77 | 1.67 | 2.77 | 1.68 | 0.78 | 0.87 | -0.13 | |
| 1.2 | 1.75 | 1.88 | 1.91 | 0.75 | 0.87 | -0.26 | -0.23 | |

# GRAFIK KENAIKAN ELEVASI MUKA AIR



**LABORATORIUM HIDROLIKA**
**JURUSAN TEKNIS SIPIL**
**UNIVERSITAS MUHAMMADIYAH MATARAM**

# EKSPERIMEN (6)

HARI/TANGGAL

JUMLAH KAYU : 120 BIJI

DEBIT : 84 $cm^2$/sec

**LABORATORIUM HIDROLIKA**
**JURUSAN TEKNIS SIPIL**
**UNIVERSITAS MUHAMMADIYAH MATARAM**
**2021**

**Eksperimen** : **6**

**debit (q)** : **84 m²/sec**

**jumlah kayu** :

| No Eksperimen | Ukuram Batang (cm) | Jumlah batang |
|---|---|---|
| | 7.5 | |
| 6 | 120 | 120 |

**waktu** : **47.58 sec**

**diameter kayu** : **5 mm**

**Posisi kayu** :

| | | |
|---|---|---|
| **hulu** | : | 80 |
| **hilir** | : | 0 |
| **sabo** | : | 7 |
| **lolos** | : | 33 |
| ∑ | = | 120 |

Tabel Pengukuran elevasi muka air dengan point gage

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | | | | | | | |
| 22.5 | | | | | | | |
| 15 | 26.17 | 26.21 | 26.4 | 26.31 | 24.42 | 22.31 | 22.4 |
| 7.5 | | | | | | | |
| 1.2 | | | | | | | |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | |
| 22.5 | | | | | | | | |
| 15 | 23.31 | 24.21 | 24.34 | 24.31 | 25.4 | 25.12 | 25.32 | 26.11 |
| 7.5 | | | | | | | | |
| 1.2 | | | | | | | | |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | | | | | | | |
| 22.5 | | | | | | | |
| 15 | 26.31 | 26.42 | 26.22 | 26.3 | 26.22 | 26.1 | |
| 7.5 | | | | | | | |
| 1.2 | | | | | | | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | |
| 22.5 | | | | | | | | |
| 15 | 29.21 | 29.42 | 29.49 | 29.32 | 29.31 | 29.43 | 29.54 | |
| 7.5 | | | | | | | | |
| 1.2 | | | | | | | | |

Tabel Elevasi tinggi muka air  tertahan

| Hasil Data | -20 | -15 | -10 |
|---|---|---|---|
| Elevasi rata rata | 26.17 | 26.21 | 26.4 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 |
| H air | 0.91 | 0.87 | 0.68 |
| Elevasi air tanpa sabo Q 84 | 26.45 | 26.45 | 26.45 |
| h air normal | 0.63 | 0.63 | 0.63 |
| Penambahan H air akibat sabo | 0.28 | 0.24 | 0.05 |

| Hasil Data | -5 | -3.5 | 1.2 | 5 | 10 |
|---|---|---|---|---|---|
| Elevasi rata rata | 26.31 | 24.42 | 22.31 | 22.4 | 23.31 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 0.77 | 2.66 | 4.77 | 4.68 | 3.77 |
| Elevasi air tanpa sabo Q 84 | 26.45 | 26.45 | 26.45 | 26.45 | 26.45 |
| h air normal | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 |
| Penambahan H air akibat sabo | 0.14 | 2.03 | 4.14 | 4.05 | 3.14 |

| Hasil Data | 15 | 20 | 25 | 30 | 35 |
|---|---|---|---|---|---|
| Elevasi rata rata | 24.21 | 24.34 | 24.31 | 25.4 | 25.12 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 2.87 | 2.74 | 2.77 | 1.68 | 1.96 |
| Elevasi air tanpa sabo Q 84 | 26.45 | 26.45 | 26.45 | 26.45 | 26.45 |
| h air normal | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 |
| Penambahan H air akibat sabo | 2.24 | 2.11 | 2.14 | 1.05 | 1.33 |

| Hasil Data | 40 | 45 | 65 | 70 | 75 |
|---|---|---|---|---|---|
| Elevasi rata rata | 25.32 | 26.11 | 26.31 | 26.42 | 26.22 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 1.76 | 0.97 | 0.77 | 0.66 | 0.86 |
| Elevasi air tanpa sabo Q 84 | 26.45 | 26.45 | 26.45 | 26.45 | 26.45 |
| h air normal | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 |
| Penambahan H air akibat sabo | 1.13 | 0.34 | 0.14 | 0.03 | 0.23 |

| Hasil Data | 80 | 85 | 90 | 95 | 100 |
|---|---|---|---|---|---|
| Elevasi rata rata | 26.3 | 26.22 | 26.1 | | 29.21 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | | 27.08 |
| H air | 0.78 | 0.86 | 0.98 | | -2.13 |
| Elevasi air tanpa sabo Q 84 | 26.45 | 26.45 | 26.45 | | 26.45 |
| h air normal | 0.63 | 0.63 | 0.63 | | 0.63 |

| | | | | | |
|---|---|---|---|---|---|
| Penambahan H air akibat sabo | 0.15 | 0.23 | 0.35 | | -2.76 |

| Hasil Data | 115 | 120 | 125 | 130 | 135 |
|---|---|---|---|---|---|
| Elevasi rata rata | 29.42 | 29.49 | 29.32 | 29.31 | 29.43 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | -2.34 | -2.41 | -2.24 | -2.23 | -2.35 |
| Elevasi air tanpa sabo Q 84 | 26.45 | 26.45 | 26.45 | 26.45 | 26.45 |
| h air normal | 0.63 | 0.63 | 0.63 | 0.63 | 0.63 |
| Penambahan H air akibat sabo | -2.97 | -3.04 | -2.87 | -2.86 | -2.98 |

| Hasil Data | 140 | 145 |
|---|---|---|
| Elevasi rata rata | 29.54 | |
| Elevasi dasar fluem | 27.08 | |
| H air | -2.46 | |
| Elevasi air tanpa sabo Q 84 | 26.45 | |
| h air normal | 0.63 | |
| Penambahan H air akibat sabo | -3.09 | |

Tabel hasil pengukuran debit sebelum pengukuran

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.97 | 10 | 2 | 8 | 89.79 |
| no. 2 (t = 90 detik ) | 3.01 | 10 | 2 | 8 | 88.59 |

Tabel hasil pengukuran debit saat pengukuran

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.86 | 9 | 2 | 7 | 81.59 |
| no. 2 (t = 90 detik ) | 2.64 | 9 | 2 | 7 | 88.38 |

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.73 | 9 | 2 | 7 | 85.47 |
| no. 2 (t = 90 detik ) | 2.6 | 8.5 | 2 | 6.5 | 83.33 |

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.63 | 8 | 2 | 6 | 76.05 |
| no. 2 (t = 90 detik ) | 2.72 | 9 | 2 | 7 | 85.78 |

Tabel Pengukuran elevasi dasar saluran dengan point gage

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | 27.35 | 28.42 | 27.21 | 27.42 | 27.31 | 28.31 | 27.43 |
| 22.5 | 28.41 | 28.11 | 28.42 | 28.34 | 27.32 | 27.42 | 28.31 |
| 15 | 29.21 | 28.22 | 28.46 | 28.44 | 27.22 | 29.22 | 27.33 |
| 7.5 | 29.31 | 28.35 | 28.32 | 28.33 | 26.41 | 27.42 | 27.42 |
| 1.2 | 28.3 | 28.34 | 28.41 | 27.21 | 26.42 | 28.31 | 26.44 |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | 27.44 | 27.44 | 27.4 | 26.42 | 27.31 | 26.44 | 27.22 | 27.41 |
| 22.5 | 27.31 | 26.3 | 27.31 | 26.43 | 27.43 | 27.41 | 27.25 | 28.31 |
| 15 | 26.31 | 26.41 | 26.42 | 26.31 | 26.41 | 27.3 | 28.42 | 28.41 |
| 7.5 | 27.2 | 27.52 | 26.11 | 27.42 | 27.2 | 27.32 | 29.33 | 28.42 |
| 1.2 | 27.12 | 28.42 | 27.21 | 27.31 | 26.2 | 27.12 | 28.17 | 28.34 |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | 27.44 | 27.12 | 27.32 | 27.35 | 27.07 | 27.48 | |
| 22.5 | 27.02 | 27.15 | 27.15 | 27.27 | 26.22 | 26.44 | |
| 15 | 27.05 | 27.14 | 27.44 | 28.22 | 27.17 | 27.47 | |
| 7.5 | 26.35 | 27.44 | 27.01 | 27.07 | 27.27 | 28.44 | |
| 1.2 | 27.44 | 27.02 | 27.47 | 27.34 | 28.16 | 28.23 | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | 27.12 | 27.09 | 27.48 | 27.38 | 28.38 | 28.49 | 28.48 | |
| 22.5 | 26.16 | 26.24 | 27.28 | 27.36 | 26.52 | 28.06 | 28.23 | |
| 15 | 26.12 | 26.46 | 26.03 | 25.37 | 26.45 | 25.44 | 26.12 | |
| 7.5 | 26.13 | 27.44 | 26.03 | 25.33 | 25.03 | 25.23 | 26.06 | |
| 1.2 | 26.43 | 27.53 | 26.04 | 27.28 | 26.26 | 25.3 | 26.21 | |

Tabel kenaikan elevasi dasar sungai

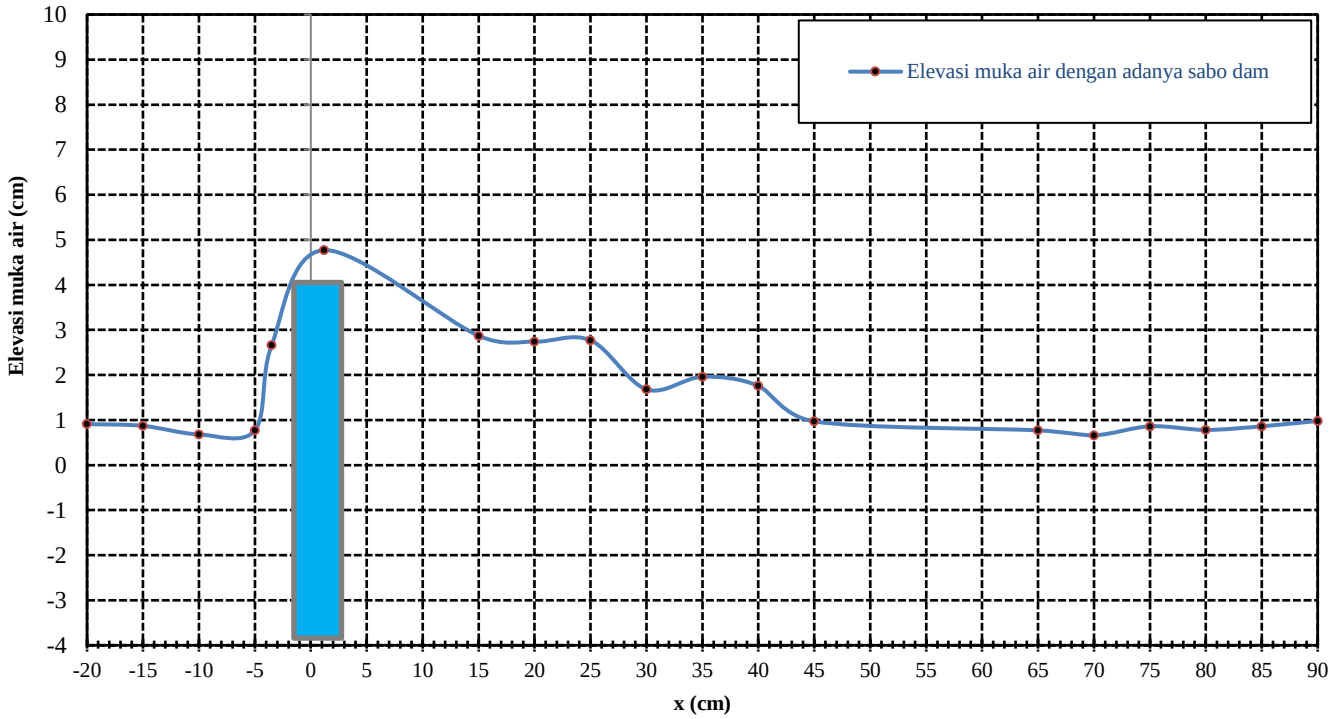
| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | -0.27 | -1.34 | -0.13 | -0.34 | -0.23 | -1.23 | -0.35 |
| 22.5 | -1.33 | -1.03 | -1.34 | -1.26 | -0.24 | -0.34 | -1.23 |
| 15 | -2.13 | -1.14 | -1.38 | -1.36 | -0.14 | -2.14 | -0.25 |
| 7.5 | -2.23 | -1.27 | -1.24 | -1.25 | 0.67 | -0.34 | -0.34 |
| 1.2 | -1.22 | -1.26 | -1.33 | -0.13 | 0.66 | -1.23 | 0.64 |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | -0.36 | -0.36 | -0.32 | 0.66 | -0.23 | 0.64 | -0.14 | -0.33 |
| 22.5 | -0.23 | 0.78 | -0.23 | 0.65 | -0.35 | -0.33 | -0.17 | -1.23 |
| 15 | 0.77 | 0.67 | 0.66 | 0.77 | 0.67 | -0.22 | -1.34 | -1.33 |
| 7.5 | -0.12 | -0.44 | 0.97 | -0.34 | -0.12 | -0.24 | -2.25 | -1.34 |
| 1.2 | -0.04 | -1.34 | -0.13 | -0.23 | 0.88 | -0.04 | -1.09 | -1.26 |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | -0.36 | -0.04 | -0.24 | -0.27 | 0.01 | -0.40 | |
| 22.5 | 0.06 | -0.07 | -0.07 | -0.19 | 0.86 | 0.64 | |
| 15 | 0.03 | -0.06 | -0.36 | -1.14 | -0.09 | -0.39 | |
| 7.5 | 0.73 | -0.36 | 0.07 | 0.01 | -0.19 | -1.36 | |
| 1.2 | -0.36 | 0.06 | -0.39 | -0.26 | -1.08 | -1.15 | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | -0.04 | -0.01 | -0.40 | -0.30 | -1.30 | -1.41 | -1.40 | |
| 22.5 | 0.92 | 0.84 | -0.20 | -0.28 | 0.56 | -0.98 | -1.15 | |
| 15 | 0.96 | 0.62 | 1.05 | 1.71 | 0.63 | 1.64 | 0.96 | |
| 7.5 | 0.95 | -0.36 | 1.05 | 1.75 | 2.05 | 1.85 | 1.02 | |
| 1.2 | 0.65 | -0.45 | 1.04 | -0.20 | 0.82 | 1.78 | 0.87 | |

# GRAFIK KENAIKAN ELEVASI MUKA AIR



**LABORATORIUM HIDROLIKA**
**JURUSAN TEKNIS SIPIL**
**UNIVERSITAS MUHAMMADIYAH MATARAM**

# EKSPERIMEN (7)

HARI/TANGGAL

JUMLAH KAYU : 120 BIJI

DEBIT : 63 $cm^2$/sec

**LABORATORIUM HIDROLIKA**
**JURUSAN TEKNIS SIPIL**
**UNIVERSITAS MUHAMMADIYAH MATARAM**
**2021**

**Eksperimen** : **7**

**debit (q)** : **63 m²/sec**

**jumlah kayu** :

| No Eksperimen | Ukuran Batang (cm) | Jumlah batang |
|---|---|---|
| | 7.5 | |
| 7 | 120 | 120 |

**waktu** : **37.08 sec**

**diameter kayu** : **5 mm**

**Posisi kayu** : **hulu** : 59

**hilir** : 2

**sabo** : 15

**lolos** : 44

∑ = 120

Tabel Pengukuran elevasi muka air dengan point gage

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | | | | | | | |
| 22.5 | | | | | | | |
| 15 | 26.22 | 26.31 | 26.44 | 26.43 | 22.81 | 22.41 | 22.6 |
| 7.5 | | | | | | | |
| 1.2 | | | | | | | |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | |
| 22.5 | | | | | | | | |
| 15 | 22.87 | 23.2 | 23.24 | 24.33 | 24.32 | 25.4 | 25.22 | 25.5 |
| 7.5 | | | | | | | | |
| 1.2 | | | | | | | | |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | | | | | | | |
| 22.5 | | | | | | | |
| 15 | 26.31 | 26.17 | 26.3 | 26.4 | 26.42 | 26.1 | |
| 7.5 | | | | | | | |
| 1.2 | | | | | | | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | |
| 22.5 | | | | | | | | |
| 15 | 29.41 | 29.12 | 29.11 | 29.18 | 29.18 | 29.21 | 29.32 | |
| 7.5 | | | | | | | | |
| 1.2 | | | | | | | | |

Tabel Elevasi tinggi muka air  tertahan

| Hasil Data | -20 | -15 | -10 |
|---|---|---|---|
| Elevasi rata rata | 26.22 | 26.31 | 26.44 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 |
| H air | 0.86 | 0.77 | 0.64 |
| Elevasi air tanpa sabo Q 63 | 26.95 | 26.95 | 26.95 |
| h air normal | 0.13 | 0.13 | 0.13 |
| Penambahan H air akibat sabo | 0.73 | 0.64 | 0.51 |

| Hasil Data | -5 | -3.5 | 1.2 | 5 | 10 |
|---|---|---|---|---|---|
| Elevasi rata rata | 26.43 | 22.81 | 22.41 | 22.6 | 22.87 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 0.65 | 4.27 | 4.67 | 4.48 | 4.21 |
| Elevasi air tanpa sabo Q 63 | 26.95 | 26.95 | 26.95 | 26.95 | 26.95 |
| h air normal | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 |
| Penambahan H air akibat sabo | 0.52 | 4.14 | 4.54 | 4.35 | 4.08 |

| Hasil Data | 15 | 20 | 25 | 30 | 35 |
|---|---|---|---|---|---|
| Elevasi rata rata | 23.2 | 23.24 | 24.33 | 24.32 | 25.4 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 3.88 | 3.84 | 2.75 | 2.76 | 1.68 |
| Elevasi air tanpa sabo Q 63 | 26.95 | 26.95 | 26.95 | 26.95 | 26.95 |
| h air normal | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 |
| Penambahan H air akibat sabo | 3.75 | 3.71 | 2.62 | 2.63 | 1.55 |

| Hasil Data | 40 | 45 | 65 | 70 | 75 |
|---|---|---|---|---|---|
| Elevasi rata rata | 25.22 | 25.5 | 26.31 | 26.17 | 26.3 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 1.86 | 1.58 | 0.77 | 0.91 | 0.78 |
| Elevasi air tanpa sabo Q 63 | 26.95 | 26.95 | 26.95 | 26.95 | 26.95 |
| h air normal | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 |
| Penambahan H air akibat sabo | 1.73 | 1.45 | 0.64 | 0.78 | 0.65 |

| Hasil Data | 80 | 85 | 90 | 95 | 100 |
|---|---|---|---|---|---|
| Elevasi rata rata | 26.4 | 26.42 | 26.1 | | 29.41 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | | 27.08 |
| H air | 0.68 | 0.66 | 0.98 | | -2.33 |
| Elevasi air tanpa sabo Q 63 | 26.95 | 26.95 | 26.95 | | 26.95 |
| h air normal | 0.13 | 0.13 | 0.13 | | 0.13 |
| Penambahan H air akibat sabo | 0.55 | 0.53 | 0.85 | | -2.46 |

| Hasil Data | 115 | 120 | 125 | 130 | 135 |
|---|---|---|---|---|---|
| Elevasi rata rata | 29.12 | 29.11 | 29.18 | 29.18 | 29.21 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | -2.04 | -2.03 | -2.1 | -2.1 | -2.13 |
| Elevasi air tanpa sabo Q 63 | 26.95 | 26.95 | 26.95 | 26.95 | 26.95 |
| h air normal | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 |
| Penambahan H air akibat sabo | -2.17 | -2.16 | -2.23 | -2.23 | -2.26 |

| Hasil Data | 140 | 145 |
|---|---|---|
| Elevasi rata rata | 29.32 | |
| Elevasi dasar fluem | 27.08 | |
| H air | -2.24 | |
| Elevasi air tanpa sabo Q 63 | 26.95 | |
| h air normal | 0.13 | |
| Penambahan H air akibat sabo | -2.37 | |

Tabel hasil pengukuran debit sebelum pengukuran

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( $cm^2/s$ ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.72 | 7 | 2 | 5 | 61.27 |
| no. 2 (t = 90 detik ) | 2.9 | 8 | 2 | 6 | 68.97 |

Tabel hasil pengukuran debit saat pengukuran

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( $cm^2/s$ ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.71 | 7 | 2 | 5 | 61.50 |
| no. 2 (t = 90 detik ) | 2.7 | 7 | 2 | 5 | 61.73 |

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.68 | 7 | 2 | 5 | 62.19 |
| no. 2 (t = 90 detik ) | 2.59 | 7 | 2 | 5 | 64.35 |

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.76 | 7 | 2 | 5 | 60.39 |
| no. 2 (t = 90 detik ) | 2.98 | 8 | 2 | 6 | 67.11 |

Tabel Pengukuran elevasi dasar saluran dengan point gage

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | 27.4 | 27.11 | 28.31 | 28.32 | 27.32 | 25.17 | 27.21 |
| 22.5 | 28.4 | 28.42 | 28.42 | 28.24 | 27.1 | 23.31 | 28.1 |
| 15 | 28.41 | 29.3 | 28.42 | 28.17 | 27.11 | 24.3 | 28.31 |
| 7.5 | 28.32 | 28.41 | 28.31 | 28.22 | 28.41 | 24.12 | 28.22 |
| 1.2 | 28.42 | 28.31 | 28.33 | 27.11 | 27.41 | 22.11 | 28.31 |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | 27.41 | 27.41 | 26.4 | 27.35 | 27.4 | 27.32 | 27.31 | 27.31 |
| 22.5 | 25.31 | 26.4 | 25.31 | 26.42 | 26.2 | 27.2 | 27.43 | 26.42 |
| 15 | 26.4 | 27.31 | 27.31 | 26.4 | 26.22 | 27.22 | 27.42 | 28.21 |
| 7.5 | 25.31 | 27.11 | 26.3 | 27.11 | 25.31 | 27.42 | 26.17 | 27.11 |
| 1.2 | 27.32 | 26.21 | 27.41 | 27.34 | 27.21 | 27.32 | 26.42 | 27.31 |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | 27.41 | 27.43 | 27.41 | 28.41 | 27.34 | 28.45 | |
| 22.5 | 27.3 | 27.11 | 27.2 | 27.42 | 27.15 | 28.44 | |
| 15 | 27.41 | 26.1 | 27.4 | 27.57 | 28.23 | 28.04 | |
| 7.5 | 27.31 | 27.22 | 26.1 | 27.39 | 28.4 | 28.49 | |
| 1.2 | 27.41 | 27.2 | 27.31 | 27.33 | 27.38 | 27.14 | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | 27.27 | 27.44 | 28.44 | 27.26 | 27.05 | 27.22 | 28.39 | |
| 22.5 | 27.34 | 27.05 | 26.5 | 27.18 | 27.58 | 27.41 | 28.05 | |
| 15 | 27.06 | 27.37 | 27.3 | 27.14 | 28.11 | 28.27 | 28.26 | |
| 7.5 | 27.2 | 27.07 | 26.26 | 28.51 | 27.37 | 27.26 | 28.33 | |
| 1.2 | 27.47 | 28.22 | 28.51 | 27.43 | 28.53 | 28.51 | 28.03 | |

Tabel kenaikan elevasi dasar sungai

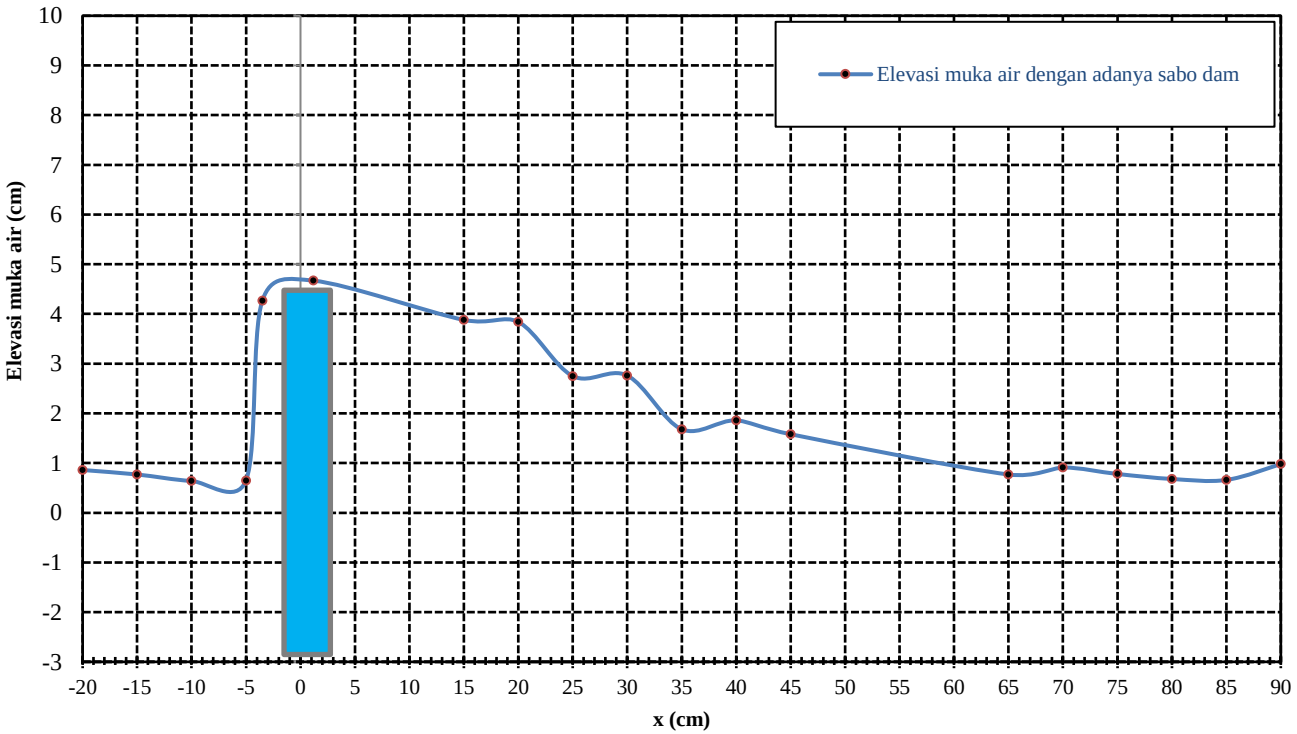
| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | -0.32 | -0.03 | -1.23 | -1.24 | -0.24 | 1.91 | -0.13 |
| 22.5 | -1.32 | -1.34 | -1.34 | -1.16 | -0.02 | 3.77 | -1.02 |
| 15 | -1.33 | -2.22 | -1.34 | -1.09 | -0.03 | 2.78 | -1.23 |
| 7.5 | -1.24 | -1.33 | -1.23 | -1.14 | -1.33 | 2.96 | -1.14 |
| 1.2 | -1.34 | -1.23 | -1.25 | -0.03 | -0.33 | 4.97 | -1.23 |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | -0.33 | -0.33 | 0.68 | -0.27 | -0.32 | -0.24 | -0.23 | -0.23 |
| 22.5 | 1.77 | 0.68 | 1.77 | 0.66 | 0.88 | -0.12 | -0.35 | 0.66 |
| 15 | 0.68 | -0.23 | -0.23 | 0.68 | 0.86 | -0.14 | -0.34 | -1.13 |
| 7.5 | 1.77 | -0.03 | 0.78 | -0.03 | 1.77 | -0.34 | 0.91 | -0.03 |
| 1.2 | -0.24 | 0.87 | -0.33 | -0.26 | -0.13 | -0.24 | 0.66 | -0.23 |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | -0.33 | -0.35 | -0.33 | -1.33 | -0.26 | -1.37 | |
| 22.5 | -0.22 | -0.03 | -0.12 | -0.34 | -0.07 | -1.36 | |
| 15 | -0.33 | 0.98 | -0.32 | -0.49 | -1.15 | -0.96 | |
| 7.5 | -0.23 | -0.14 | 0.98 | -0.31 | -1.32 | -1.41 | |
| 1.2 | -0.33 | -0.12 | -0.23 | -0.25 | -0.30 | -0.06 | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | -0.19 | -0.36 | -1.36 | -0.18 | 0.03 | -0.14 | -1.31 | |
| 22.5 | -0.26 | 0.03 | 0.58 | -0.10 | -0.50 | -0.33 | -0.97 | |
| 15 | 0.02 | -0.29 | -0.22 | -0.06 | -1.03 | -1.19 | -1.18 | |
| 7.5 | -0.12 | 0.01 | 0.82 | -1.43 | -0.29 | -0.18 | -1.25 | |
| 1.2 | -0.39 | -1.14 | -1.43 | -0.35 | -1.45 | -1.43 | -0.95 | |

# GRAFIK KENAIKAN ELEVASI MUKA AIR



**LABORATORIUM HIDROLIKA**
**JURUSAN TEKNIS SIPIL**
**UNIVERSITAS MUHAMMADIYAH MATARAM**

# EKSPERIMEN (8)

HARI/TANGGAL

JUMLAH KAYU : 120 BIJI

DEBIT : 107 $cm^2$/sec

**LABORATORIUM HIDROLIKA**
**JURUSAN TEKNIS SIPIL**
**UNIVERSITAS MUHAMMADIYAH MATARAM**
**2021**

**Eksperimen** : **8**

**debit (q)** : **107m²/sec**

**jumlah kayu** :

| No Eksperimen | Ukuran Batang (cm) | Jumlah batang |
|---|---|---|
| | 7.5 | |
| 8 | 120 | 120 |

**waktu** : **40 sec**

**diameter kayu** : **5 mm**

**Posisi kayu** : **hulu** : 39

**hilir** : 0

**sabo** : 1

**lolos** : 80

∑ = 120

Tabel Pengukuran elevasi muka air dengan point gage

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | | | | | | | |
| 22.5 | | | | | | | |
| 15 | 25.41 | 25.35 | 25.31 | 25.4 | 22.42 | 21.31 | 21.84 |
| 7.5 | | | | | | | |
| 1.2 | | | | | | | |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | |
| 22.5 | | | | | | | | |
| 15 | 22.41 | 23.4 | 23.34 | 23.42 | 24.42 | 24.32 | 24.45 | 25.31 |
| 7.5 | | | | | | | | |
| 1.2 | | | | | | | | |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | | | | | | | |
| 22.5 | | | | | | | |
| 15 | 25.21 | 25.32 | 25.41 | 25.34 | 25.22 | 25.11 | |
| 7.5 | | | | | | | |
| 1.2 | | | | | | | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | |
| 22.5 | | | | | | | | |
| 15 | 29.22 | 29.32 | 29.21 | 29.12 | 29.13 | 29.25 | 29.32 | |
| 7.5 | | | | | | | | |
| 1.2 | | | | | | | | |

Tabel Elevasi tinggi muka air  tertahan

| Hasil Data | -20 | -15 | -10 |
|---|---|---|---|
| Elevasi rata rata | 25.41 | 25.35 | 25.31 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 |
| H air | 1.67 | 1.73 | 1.77 |
| Elevasi air tanpa sabo Q 107 | 25.99 | 25.99 | 25.99 |
| h air normal | 1.09 | 1.09 | 1.09 |
| Penambahan H air akibat sabo | 0.58 | 0.64 | 0.68 |

| Hasil Data | -5 | -3.5 | 1.2 | 5 | 10 |
|---|---|---|---|---|---|
| Elevasi rata rata | 25.4 | 22.42 | 21.31 | 21.84 | 22.41 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 1.68 | 4.66 | 5.77 | 5.24 | 4.67 |
| Elevasi air tanpa sabo Q 107 | 25.99 | 25.99 | 25.99 | 25.99 | 25.99 |
| h air normal | 1.09 | 1.09 | 1.09 | 1.09 | 1.09 |
| Penambahan H air akibat sabo | 0.59 | 3.57 | 4.68 | 4.15 | 3.58 |

| Hasil Data | 15 | 20 | 25 | 30 | 35 |
|---|---|---|---|---|---|
| Elevasi rata rata | 23.4 | 23.34 | 23.42 | 24.42 | 24.32 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 3.68 | 3.74 | 3.66 | 2.66 | 2.76 |
| Elevasi air tanpa sabo Q 107 | 25.99 | 25.99 | 25.99 | 25.99 | 25.99 |
| h air normal | 1.09 | 1.09 | 1.09 | 1.09 | 1.09 |
| Penambahan H air akibat sabo | 2.59 | 2.65 | 2.57 | 1.57 | 1.67 |

| Hasil Data | 40 | 45 | 65 | 70 | 75 |
|---|---|---|---|---|---|
| Elevasi rata rata | 24.45 | 25.31 | 25.21 | 25.32 | 25.41 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 2.63 | 1.77 | 1.87 | 1.76 | 1.67 |
| Elevasi air tanpa sabo Q 107 | 25.99 | 25.99 | 25.99 | 25.99 | 25.99 |
| h air normal | 1.09 | 1.09 | 1.09 | 1.09 | 1.09 |
| Penambahan H air akibat sabo | 1.54 | 0.68 | 0.78 | 0.67 | 0.58 |

| Hasil Data | 80 | 85 | 90 | 95 | 100 |
|---|---|---|---|---|---|
| Elevasi rata rata | 25.34 | 25.22 | 25.11 | | 29.22 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | | 27.08 |
| H air | 1.74 | 1.86 | 1.97 | | -2.14 |
| Elevasi air tanpa sabo Q 107 | 25.99 | 25.99 | 25.99 | | 25.99 |
| h air normal | 1.09 | 1.09 | 1.09 | | 1.09 |
| Penambahan H air akibat sabo | 0.65 | 0.77 | 0.88 | | -3.23 |

| Hasil Data | 115 | 120 | 125 | 130 | 135 |
|---|---|---|---|---|---|
| Elevasi rata rata | 29.32 | 29.21 | 29.12 | 29.13 | 29.25 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | -2.24 | -2.13 | -2.04 | -2.05 | -2.17 |
| Elevasi air tanpa sabo Q 107 | 25.99 | 25.99 | 25.99 | 25.99 | 25.99 |
| h air normal | 1.09 | 1.09 | 1.09 | 1.09 | 1.09 |
| Penambahan H air akibat sabo | -3.33 | -3.22 | -3.13 | -3.14 | -3.26 |

| Hasil Data | 140 | 145 |
|---|---|---|
| Elevasi rata rata | 29.32 | |
| Elevasi dasar fluem | 27.08 | |
| H air | -2.24 | |
| Elevasi air tanpa sabo Q 107 | 25.99 | |
| h air normal | 1.09 | |
| Penambahan H air akibat sabo | -3.33 | |

Tabel hasil pengukuran debit sebelum pengukuran

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.5 | 9.5 | 2 | 7.5 | 100.00 |
| no. 2 (t = 90 detik ) | 2.51 | 10 | 2 | 8 | 106.24 |

Tabel hasil pengukuran debit saat pengukuran

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.31 | 10 | 2 | 8 | 115.44 |
| no. 2 (t = 90 detik ) | 2.27 | 9 | 2 | 7 | 102.79 |

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.22 | 10 | 2 | 8 | 120.12 |
| no. 2 (t = 90 detik ) | 2.44 | 9 | 2 | 7 | 95.63 |

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.63 | 10.5 | 2 | 8.5 | 107.73 |
| no. 2 (t = 90 detik ) | 2.32 | 10 | 2 | 8 | 114.94 |

Tabel Pengukuran elevasi dasar saluran dengan point gage

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | 27.41 | 28.42 | 28.32 | 28.45 | 26.45 | 27.31 | 27.33 |
| 22.5 | 28.27 | 28.31 | 28.3 | 27.41 | 27.25 | 25.44 | 27.41 |
| 15 | 28.23 | 28.35 | 28.41 | 28.42 | 27.17 | 26.42 | 27.11 |
| 7.5 | 28.12 | 28.23 | 28.21 | 28.5 | 27.12 | 25.32 | 26.22 |
| 1.2 | 28.23 | 28.42 | 28.11 | 28.41 | 26.3 | 26.18 | 26.22 |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | 27.42 | 26.4 | 27.42 | 26.42 | 26.51 | 26.45 | 27.12 | 26.41 |
| 22.5 | 26.43 | 26.42 | 25.4 | 26.42 | 26.4 | 27.32 | 26.41 | 26.4 |
| 15 | 27.4 | 26.42 | 26.21 | 26.4 | 26.1 | 26.42 | 28.11 | 28.31 |
| 7.5 | 25.22 | 26.21 | 27.22 | 26.3 | 27.42 | 27.42 | 27.31 | 28.4 |
| 1.2 | 26.12 | 27.23 | 27.25 | 27.34 | 27.21 | 27.31 | 27.22 | 27.4 |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | 24.2 | 23.4 | 25.3 | 25.15 | 24.31 | 25.21 | |
| 22.5 | 24.21 | 23.42 | 24.4 | 24.32 | 24.4 | 24.32 | |
| 15 | 26.2 | 25.31 | 25.41 | 25.41 | 25.42 | 26.3 | |
| 7.5 | 26.21 | 26.4 | 25.51 | 25.5 | 25.4 | 25.31 | |
| 1.2 | 26.4 | 27.41 | 26.5 | 27.4 | 25.52 | 25.41 | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | 26.43 | 27.31 | 27.59 | 28.54 | 27.01 | 27.18 | 27.37 | |
| 22.5 | 36.15 | 26.44 | 26.15 | 28.43 | 27.46 | 27.47 | 26.33 | |
| 15 | 26.48 | 26.17 | 26.39 | 27.59 | 27.1 | 25.22 | 25.35 | |
| 7.5 | 26.38 | 25.54 | 26.47 | 25.24 | 25.37 | 25.23 | 25.04 | |
| 1.2 | 27.05 | 26.22 | 26.1 | 25.49 | 27.22 | 25.31 | 26.27 | |

Tabel kenaikan elevasi dasar sungai

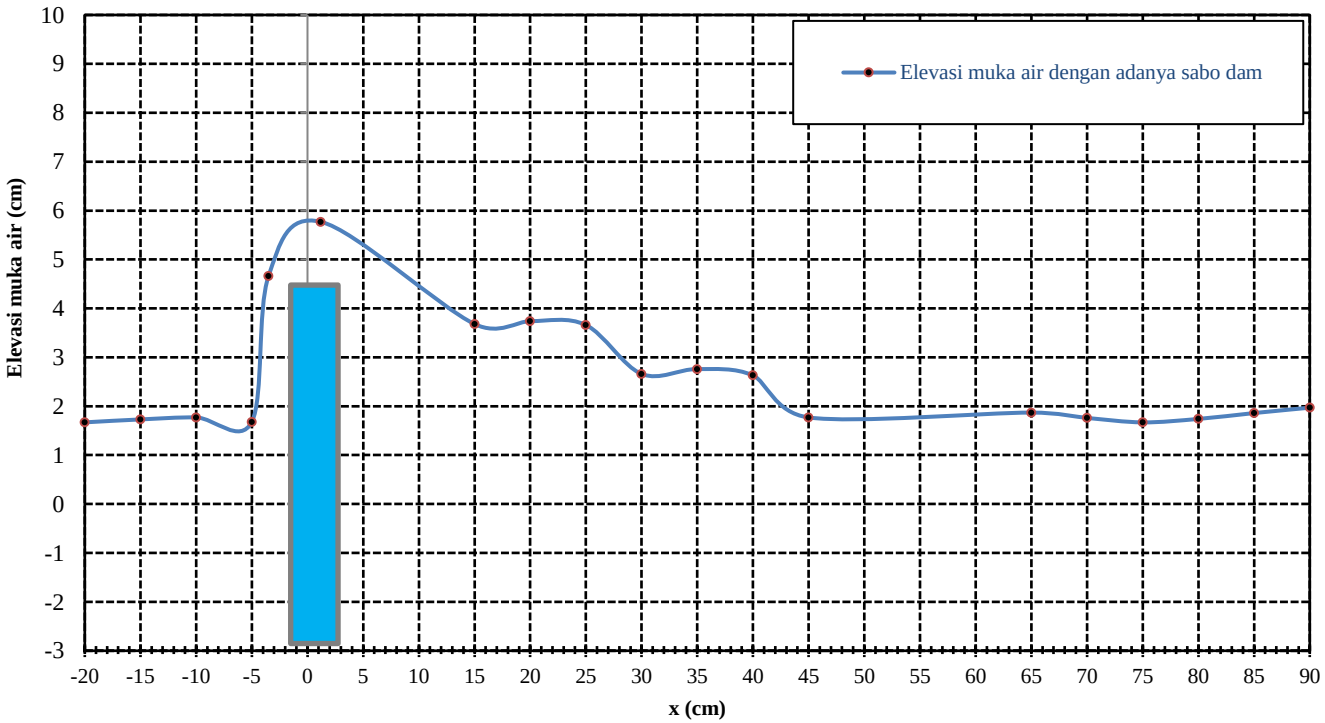
| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | -0.33 | -1.34 | -1.24 | -1.37 | 0.63 | -0.23 | -0.25 |
| 22.5 | -1.19 | -1.23 | -1.22 | -0.33 | -0.17 | 1.64 | -0.33 |
| 15 | -1.15 | -1.27 | -1.33 | -1.34 | -0.09 | 0.66 | -0.03 |
| 7.5 | -1.04 | -1.15 | -1.13 | -1.42 | -0.04 | 1.76 | 0.86 |
| 1.2 | -1.15 | -1.34 | -1.03 | -1.33 | 0.78 | 0.90 | 0.86 |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | -0.34 | 0.68 | -0.34 | 0.66 | 0.57 | 0.63 | -0.04 | 0.67 |
| 22.5 | 0.65 | 0.66 | 1.68 | 0.66 | 0.68 | -0.24 | 0.67 | 0.68 |
| 15 | -0.32 | 0.66 | 0.87 | 0.68 | 0.98 | 0.66 | -1.03 | -1.23 |
| 7.5 | 1.86 | 0.87 | -0.14 | 0.78 | -0.34 | -0.34 | -0.23 | -1.32 |
| 1.2 | 0.96 | -0.15 | -0.17 | -0.26 | -0.13 | -0.23 | -0.14 | -0.32 |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | 2.88 | 3.68 | 1.78 | 1.93 | 2.77 | 1.87 | |
| 22.5 | 2.87 | 3.66 | 2.68 | 2.76 | 2.68 | 2.76 | |
| 15 | 0.88 | 1.77 | 1.67 | 1.67 | 1.66 | 0.78 | |
| 7.5 | 0.87 | 0.68 | 1.57 | 1.58 | 1.68 | 1.77 | |
| 1.2 | 0.68 | -0.33 | 0.58 | -0.32 | 1.56 | 1.67 | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | 0.65 | -0.23 | -0.51 | -1.46 | 0.07 | -0.10 | -0.29 | |
| 22.5 | -9.07 | 0.64 | 0.93 | -1.35 | -0.38 | -0.39 | 0.75 | |
| 15 | 0.60 | 0.91 | 0.69 | -0.51 | -0.02 | 1.86 | 1.73 | |
| 7.5 | 0.70 | 1.54 | 0.61 | 1.84 | 1.71 | 1.85 | 2.04 | |
| 1.2 | 0.03 | 0.86 | 0.98 | 1.59 | -0.14 | 1.77 | 0.81 | |

# GRAFIK KENAIKAN ELEVASI MUKA AIR



**LABORATORIUM HIDROLIKA**
**JURUSAN TEKNIS SIPIL**
**UNIVERSITAS MUHAMMADIYAH MATARAM**

# EKSPERIMEN (9)

HARI/TANGGAL

JUMLAH KAYU : 120 BIJI

DEBIT : 235 cm²/sec

**LABORATORIUM HIDROLIKA**
**JURUSAN TEKNIS SIPIL**
**UNIVERSITAS MUHAMMADIYAH MATARAM**
**2021**

**Eksperimen** : **9**
**debit (q)** : **235m²/sec**

**jumlah kayu** :

| No Eksperimen | Ukuran Batang (cm) | Jumlah batang |
|---|---|---|
| | 7.5 | |
| 9 | 120 | 120 |

**waktu** : **26.28 sec**
**diameter kayu** : **5 mm**

**Posisi kayu** :

| | | |
|---|---|---|
| **hulu** | : | 2 |
| **hilir** | : | 0 |
| **sabo** | : | 0 |
| **lolos** | : | 118 |
| | ∑ = | 120 |

Tabel Pengukuran elevasi muka air dengan point gage

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | | | | | | | |
| 22.5 | | | | | | | |
| 15 | 26.22 | 27.42 | 27.31 | 27.3 | 19.43 | 18.21 | 21.3 |
| 7.5 | | | | | | | |
| 1.2 | | | | | | | |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | |
| 22.5 | | | | | | | | |
| 15 | 22.41 | 22.43 | 23.31 | 23.4 | 24.17 | 24.23 | 24.32 | 24.4 |
| 7.5 | | | | | | | | |
| 1.2 | | | | | | | | |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | | | | | | | |
| 22.5 | | | | | | | |
| 15 | 25.17 | 25.41 | 25.32 | 25.22 | 25.31 | 25.11 | |
| 7.5 | | | | | | | |
| 1.2 | | | | | | | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | |
| 22.5 | | | | | | | | |
| 15 | 24.5 | 23.4 | 24.32 | 25.41 | 25.14 | 25.21 | 24.42 | |
| 7.5 | | | | | | | | |
| 1.2 | | | | | | | | |

Tabel Elevasi tinggi muka air  tertahan

| Hasil Data | -20 | -15 | -10 |
|---|---|---|---|
| Elevasi rata rata | 26.22 | 27.42 | 27.31 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 |
| H air | 0.86 | -0.34 | -0.23 |
| Elevasi air tanpa sabo Q 235 | 27.42 | 27.42 | 27.42 |
| h air normal | -0.34 | -0.34 | -0.34 |
| Penambahan H air akibat sabo | 1.20 | 0.00 | 0.11 |

| Hasil Data | -5 | -3.5 | 1.2 | 5 | 10 |
|---|---|---|---|---|---|
| Elevasi rata rata | 27.3 | 19.43 | 18.21 | 19.05 | 21.06 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | -0.22 | 7.65 | 8.87 | 8.03 | 6.02 |
| Elevasi air tanpa sabo Q 235 | 27.42 | 27.42 | 27.42 | 27.42 | 27.42 |
| h air normal | -0.34 | -0.34 | -0.34 | -0.34 | -0.34 |
| Penambahan H air akibat sabo | 0.12 | 7.99 | 9.21 | 8.37 | 6.36 |

| Hasil Data | 15 | 20 | 25 | 30 | 35 |
|---|---|---|---|---|---|
| Elevasi rata rata | 22.43 | 23.31 | 23.4 | 24.17 | 24.23 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 4.65 | 3.77 | 3.68 | 2.91 | 2.85 |
| Elevasi air tanpa sabo Q 235 | 27.42 | 27.42 | 27.42 | 27.42 | 27.42 |
| h air normal | -0.34 | -0.34 | -0.34 | -0.34 | -0.34 |
| Penambahan H air akibat sabo | 4.99 | 4.11 | 4.02 | 3.25 | 3.19 |

| Hasil Data | 40 | 45 | 65 | 70 | 75 |
|---|---|---|---|---|---|
| Elevasi rata rata | 24.32 | 24.4 | 24.17 | 24.41 | 24.32 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 2.76 | 2.68 | 2.91 | 2.67 | 2.76 |
| Elevasi air tanpa sabo Q 235 | 27.42 | 27.42 | 27.42 | 27.42 | 27.42 |
| h air normal | -0.34 | -0.34 | -0.34 | -0.34 | -0.34 |
| Penambahan H air akibat sabo | 3.10 | 3.02 | 3.25 | 3.01 | 3.10 |

| Hasil Data | 80 | 85 | 90 | 95 | 100 |
|---|---|---|---|---|---|
| Elevasi rata rata | 24.22 | 24.31 | 24.11 | | 24.5 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | | 27.08 |
| H air | 2.86 | 2.77 | 2.97 | | 2.58 |
| Elevasi air tanpa sabo Q 235 | 27.42 | 27.42 | 27.42 | | 27.42 |
| h air normal | -0.34 | -0.34 | -0.34 | | -0.34 |

| | | | | | |
|---|---|---|---|---|---|
| Penambahan H air akibat sabo | 3.20 | 3.11 | 3.31 | | 2.92 |

| Hasil Data | 115 | 120 | 125 | 130 | 135 |
|---|---|---|---|---|---|
| Elevasi rata rata | 23.4 | 24.32 | 25.41 | 25.14 | 25.21 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 3.68 | 2.76 | 1.67 | 1.94 | 1.87 |
| Elevasi air tanpa sabo Q 235 | 27.42 | 27.42 | 27.42 | 27.42 | 27.42 |
| h air normal | -0.34 | -0.34 | -0.34 | -0.34 | -0.34 |
| Penambahan H air akibat sabo | 4.02 | 3.10 | 2.01 | 2.28 | 2.21 |

| Hasil Data | 140 | 145 |
|---|---|---|
| Elevasi rata rata | 24.42 | |
| Elevasi dasar fluem | 27.08 | |
| H air | 2.66 | |
| Elevasi air tanpa sabo Q 235 | 27.42 | |
| h air normal | -0.34 | |
| Penambahan H air akibat sabo | 3.00 | |

Tabel hasil pengukuran debit sebelum pengukuran

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 1.97 | 14 | 2 | 12 | 203.05 |
| no. 2 (t = 90 detik ) | 1.54 | 13 | 2 | 11 | 238.10 |

Tabel hasil pengukuran debit saat pengukuran

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 1.68 | 15 | 2 | 13 | 257.94 |
| no. 2 (t = 90 detik ) | 1.77 | 14 | 2 | 12 | 225.99 |

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 1.58 | 14 | 2 | 12 | 253.16 |
| no. 2 (t = 90 detik ) | 1.55 | 13 | 2 | 11 | 236.56 |

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 1.53 | 13 | 2 | 11 | 239.65 |
| no. 2 (t = 90 detik ) | 1.59 | 13 | 2 | 11 | 230.61 |

Tabel Pengukuran elevasi dasar saluran dengan point gage

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | 27.34 | 28.32 | 28.4 | 27.5 | 27.43 | 18.42 | 18.41 |
| 22.5 | 27.35 | 28.3 | 28.52 | 27.41 | 27.11 | 18.3 | 19.31 |
| 15 | 28.4 | 28.4 | 28.4 | 28.45 | 27.41 | 19.31 | 19.4 |
| 7.5 | 28.41 | 28.11 | 28.32 | 28.33 | 28.3 | 19.45 | 19.3 |
| 1.2 | 28.4 | 28.41 | 27.4 | 28.31 | 27.21 | 19.4 | 19.43 |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | 18.31 | 19.43 | 19.33 | 19.49 | 19.44 | 18.4 | 19.44 | 18.53 |
| 22.5 | 18.12 | 18.37 | 18.45 | 19.5 | 19.47 | 19.46 | 19.57 | 17.59 |
| 15 | 19.31 | 20.46 | 20.41 | 19.43 | 19.49 | 20.5 | 20.45 | 20.56 |
| 7.5 | 20.11 | 20.48 | 20.45 | 21.46 | 19.59 | 20.41 | 19.49 | 21.48 |
| 1.2 | 20.31 | 21.45 | 20.43 | 20.47 | 20.44 | 21.43 | 21.59 | 21.5 |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | 19.51 | 18.42 | 19.51 | 20.54 | 19.28 | 19.45 | |
| 22.5 | 19.48 | 19.46 | 19.21 | 19.33 | 20.39 | 20.49 | |
| 15 | 20.52 | 19.59 | 20.16 | 20.43 | 21.41 | 21.17 | |
| 7.5 | 20.52 | 21.51 | 20.4 | 20.27 | 21.37 | 20.15 | |
| 1.2 | 21.43 | 20.44 | 22.24 | 20.42 | 21.13 | 21.34 | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | 20.15 | 20.55 | 21.47 | 21.06 | 21.38 | 20.41 | 21.09 | |
| 22.5 | 20.39 | 20.07 | 21.5 | 20.46 | 20.34 | 20.37 | 21.16 | |
| 15 | 21.27 | 21.29 | 21.49 | 21.46 | 22.36 | 21.22 | 22.22 | |
| 7.5 | 20.45 | 21.05 | 21.47 | 21.15 | 21.14 | 21.23 | 22.14 | |
| 1.2 | 21.08 | 21.08 | 18.5 | 21.35 | 21.47 | 21.57 | 22.05 | |

Tabel kenaikan elevasi dasar sungai

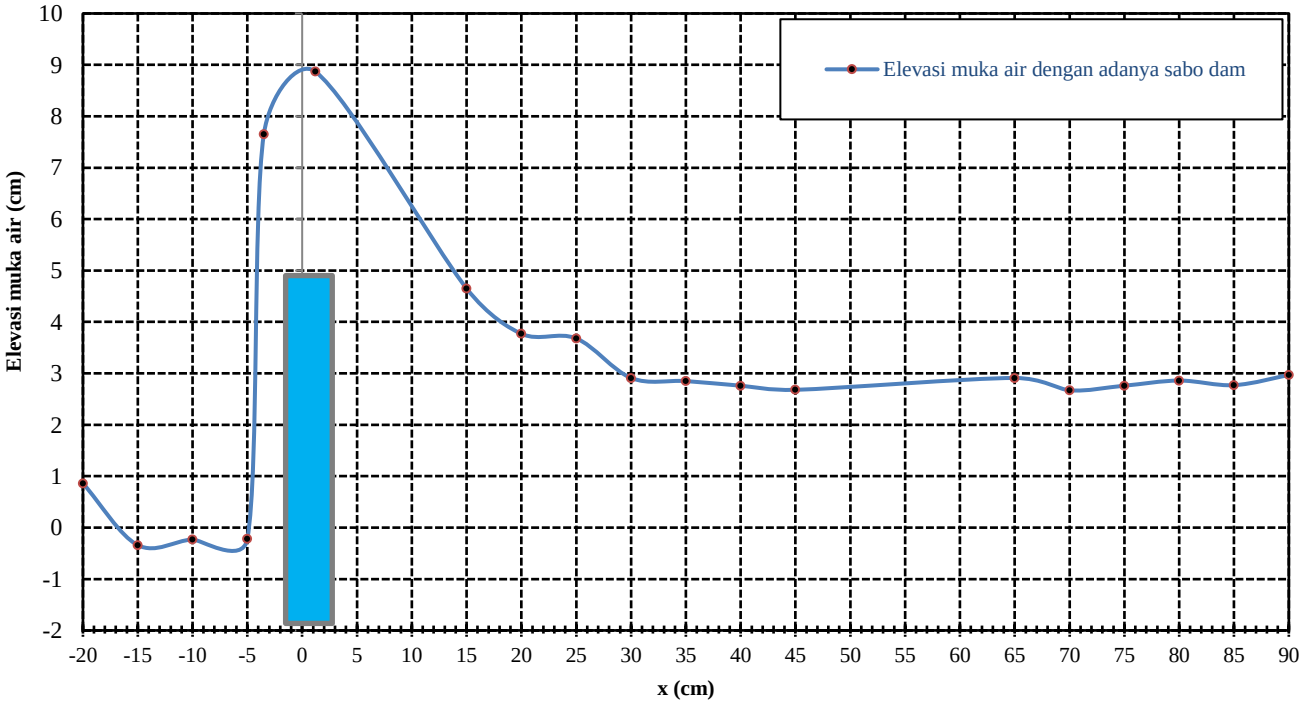
| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | -0.26 | -1.24 | -1.32 | -0.42 | -0.35 | 8.66 | 8.67 |
| 22.5 | -0.27 | -1.22 | -1.44 | -0.33 | -0.03 | 8.78 | 7.77 |
| 15 | -1.32 | -1.32 | -1.32 | -1.37 | -0.33 | 7.77 | 7.68 |
| 7.5 | -1.33 | -1.03 | -1.24 | -1.25 | -1.22 | 7.63 | 7.78 |
| 1.2 | -1.32 | -1.33 | -0.32 | -1.23 | -0.13 | 7.68 | 7.65 |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | 8.77 | 7.65 | 7.75 | 7.59 | 7.64 | 8.68 | 7.64 | 8.55 |
| 22.5 | 8.96 | 8.71 | 8.63 | 7.58 | 7.61 | 7.62 | 7.51 | 9.49 |
| 15 | 7.77 | 6.62 | 6.67 | 7.65 | 7.59 | 6.58 | 6.63 | 6.52 |
| 7.5 | 6.97 | 6.60 | 6.63 | 5.62 | 7.49 | 6.67 | 7.59 | 5.60 |
| 1.2 | 6.77 | 5.63 | 6.65 | 6.61 | 6.64 | 5.65 | 5.49 | 5.58 |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | 7.57 | 8.66 | 7.57 | 6.54 | 7.80 | 7.63 | |
| 22.5 | 7.60 | 7.62 | 7.87 | 7.75 | 6.69 | 6.59 | |
| 15 | 6.56 | 7.49 | 6.92 | 6.65 | 5.67 | 5.91 | |
| 7.5 | 6.56 | 5.57 | 6.68 | 6.81 | 5.71 | 6.93 | |
| 1.2 | 5.65 | 6.64 | 4.84 | 6.66 | 5.95 | 5.74 | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | 6.93 | 6.53 | 5.61 | 6.02 | 5.70 | 6.67 | 5.99 | |
| 22.5 | 6.69 | 7.01 | 5.58 | 6.62 | 6.74 | 6.71 | 5.92 | |
| 15 | 5.81 | 5.79 | 5.59 | 5.62 | 4.72 | 5.86 | 4.86 | |
| 7.5 | 6.63 | 6.03 | 5.61 | 5.93 | 5.94 | 5.85 | 4.94 | |
| 1.2 | 6.00 | 6.00 | 8.58 | 5.73 | 5.61 | 5.51 | 5.03 | |

# GRAFIK KENAIKAN ELEVASI MUKA AIR



**LABORATORIUM HIDROLIKA**
**JURUSAN TEKNIS SIPIL**
**UNIVERSITAS MUHAMMADIYAH MATARAM**

# EKSPERIMEN (10)

HARI/TANGGAL

JUMLAH KAYU : 120 BIJI

DEBIT : 174 $cm^2$/sec

**LABORATORIUM HIDROLIKA**
**JURUSAN TEKNIS SIPIL**
**UNIVERSITAS MUHAMMADIYAH MATARAM**
**2021**

**Eksperimen** : **10**

**debit (q)** : **174m²/sec**

**jumlah kayu** :

| No Eksperimen | Ukuran Batang (cm) | Jumlah batang |
|---|---|---|
| | 7.5 | |
| 10 | 120 | 120 |

**waktu** : **30.8 sec**

**diameter kayu** : **5 mm**

**Posisi kayu** : **hulu** : 11

**hilir** : 0

**sabo** : 0

**lolos** : 109

∑ = 120

Tabel Pengukuran elevasi muka air dengan point gage

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | | | | | | | |
| 22.5 | | | | | | | |
| 15 | 26.22 | 26.42 | 26.31 | 24.3 | 21.09 | 19.13 | 19.78 |
| 7.5 | | | | | | | |
| 1.2 | | | | | | | |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | |
| 22.5 | | | | | | | | |
| 15 | 21.11 | 22.4 | 22.3 | 23.31 | 23.24 | 23.33 | 24.41 | 24.11 |
| 7.5 | | | | | | | | |
| 1.2 | | | | | | | | |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | | | | | | | |
| 22.5 | | | | | | | |
| 15 | 24.32 | 24.41 | 24.22 | 24.42 | 24.33 | 24.43 | |
| 7.5 | | | | | | | |
| 1.2 | | | | | | | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | |
| 22.5 | | | | | | | | |
| 15 | 27.41 | 26.4 | 27.14 | 26.4 | 27.52 | 27.4 | 27.4 | |
| 7.5 | | | | | | | | |
| 1.2 | | | | | | | | |

Tabel Elevasi tinggi muka air  tertahan

| Hasil Data | -20 | -15 | -10 |
|---|---|---|---|
| Elevasi rata rata | 26.22 | 26.42 | 26.31 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 |
| H air | 0.86 | 0.66 | 0.77 |
| Elevasi air tanpa sabo Q 174 | 25.17 | 25.17 | 25.17 |
| h air normal | 1.91 | 1.91 | 1.91 |
| Penambahan H air akibat sabo | -1.05 | -1.25 | -1.14 |

| Hasil Data | -5 | -3.5 | 1.2 | 5 | 10 |
|---|---|---|---|---|---|
| Elevasi rata rata | 24.3 | 21.09 | 19.13 | 19.78 | 21.11 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 2.78 | 5.99 | 7.95 | 7.3 | 5.97 |
| Elevasi air tanpa sabo Q 174 | 25.17 | 25.17 | 25.17 | 25.17 | 25.17 |
| h air normal | 1.91 | 1.91 | 1.91 | 1.91 | 1.91 |
| Penambahan H air akibat sabo | 0.87 | 4.08 | 6.04 | 5.39 | 4.06 |

| Hasil Data | 15 | 20 | 25 | 30 | 35 |
|---|---|---|---|---|---|
| Elevasi rata rata | 22.4 | 22.3 | 23.31 | 23.24 | 23.33 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 4.68 | 4.78 | 3.77 | 3.84 | 3.75 |
| Elevasi air tanpa sabo Q 174 | 25.17 | 25.17 | 25.17 | 25.17 | 25.17 |
| h air normal | 1.91 | 1.91 | 1.91 | 1.91 | 1.91 |
| Penambahan H air akibat sabo | 2.77 | 2.87 | 1.86 | 1.93 | 1.84 |

| Hasil Data | 40 | 45 | 65 | 70 | 75 |
|---|---|---|---|---|---|
| Elevasi rata rata | 24.41 | 24.11 | 24.32 | 24.41 | 24.22 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 2.67 | 2.97 | 2.76 | 2.67 | 2.86 |
| Elevasi air tanpa sabo Q 174 | 25.17 | 25.17 | 25.17 | 25.17 | 25.17 |
| h air normal | 1.91 | 1.91 | 1.91 | 1.91 | 1.91 |
| Penambahan H air akibat sabo | 0.76 | 1.06 | 0.85 | 0.76 | 0.95 |

| Hasil Data | 80 | 85 | 90 | 95 | 100 |
|---|---|---|---|---|---|
| Elevasi rata rata | 24.42 | 24.33 | 24.43 | | 27.41 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | | 27.08 |
| H air | 2.66 | 2.75 | 2.65 | | -0.33 |
| Elevasi air tanpa sabo Q 174 | 25.17 | 25.17 | 25.17 | | 25.17 |
| h air normal | 1.91 | 1.91 | 1.91 | | 1.91 |
| Penambahan H air akibat sabo | 0.75 | 0.84 | 0.74 | | -2.24 |

| Hasil Data | 115 | 120 | 125 | 130 | 135 |
|---|---|---|---|---|---|
| Elevasi rata rata | 26.4 | 27.14 | 26.4 | 27.52 | 27.4 |
| Elevasi dasar fluem | 27.08 | 27.08 | 27.08 | 27.08 | 27.08 |
| H air | 0.68 | -0.06 | 0.68 | -0.44 | -0.32 |
| Elevasi air tanpa sabo Q 174 | 25.17 | 25.17 | 25.17 | 25.17 | 25.17 |
| h air normal | 1.91 | 1.91 | 1.91 | 1.91 | 1.91 |
| Penambahan H air akibat sabo | -1.23 | -1.97 | -1.23 | -2.35 | -2.23 |

| Hasil Data | 140 | 145 |
|---|---|---|
| Elevasi rata rata | 27.4 | |
| Elevasi dasar fluem | 27.08 | |
| H air | -0.32 | |
| Elevasi air tanpa sabo Q 174 | 25.17 | |
| h air normal | 1.91 | |
| Penambahan H air akibat sabo | -2.23 | |

Tabel hasil pengukuran debit sebelum pengukuran

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.09 | 13 | 2 | 11 | 175.44 |
| no. 2 (t = 90 detik ) | 2.13 | 13 | 2 | 11 | 172.14 |

Tabel hasil pengukuran debit saat pengukuran

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.56 | 15 | 2 | 13 | 169.27 |
| no. 2 (t = 90 detik ) | 2.09 | 13.5 | 2 | 11.5 | 183.41 |

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.34 | 14 | 2 | 12 | 170.94 |
| no. 2 (t = 90 detik ) | 2.3 | 15 | 2 | 13 | 188.41 |

| | lamanya pengukuran Δt (sec) | Masa air + ember (kg) | Masa ember (kg) | Masa air (kg) | q ( cm²/s ) |
|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 |
| no. 1 (t = 60 detik ) | 2.45 | 14 | 2 | 12 | 163.27 |
| no. 2 (t = 90 detik ) | 2.27 | 14 | 2 | 12 | 176.21 |

Tabel Pengukuran elevasi dasar saluran dengan point gage

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | 27.11 | 28.44 | 28.37 | 27.55 | 28.53 | 26.47 | 27.44 |
| 22.5 | 27.51 | 28.14 | 27.22 | 27.3 | 27.34 | 26.22 | 24.34 |
| 15 | 28.57 | 29.11 | 28.34 | 28.05 | 27.57 | 20.22 | 20.15 |
| 7.5 | 28.17 | 28.55 | 27.38 | 28.28 | 28.22 | 18.51 | 19.34 |
| 1.2 | 28.02 | 28.36 | 28.17 | 27.46 | 27.21 | 20.16 | 20.13 |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | 27.22 | 27.53 | 26.56 | 26.25 | 25.15 | 23.31 | 23.07 | 20.48 |
| 22.5 | 22.4 | 23.56 | 23.37 | 23.29 | 21.41 | 21.36 | 20.15 | 20.38 |
| 15 | 19.37 | 20.18 | 19.24 | 20.34 | 20.16 | 21.29 | 21.59 | 20.37 |
| 7.5 | 20.02 | 21.21 | 21.46 | 21.35 | 21.01 | 22.48 | 22.16 | 22.49 |
| 1.2 | 20.07 | 21.23 | 22.31 | 23.35 | 22.32 | 23.26 | 24.05 | 24.17 |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | 19.42 | 20.34 | 20.24 | 21.31 | 18.17 | 20.32 | |
| 22.5 | 20.31 | 19.42 | 19.42 | 22.34 | 20.4 | 19.42 | |
| 15 | 21.42 | 20.36 | 21.4 | 20.21 | 21.4 | 21.21 | |
| 7.5 | 23.17 | 24.41 | 22.12 | 22.32 | 22.33 | 21.43 | |
| 1.2 | 27.42 | 26.32 | 26.11 | 26.42 | 25.4 | 25.41 | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | 20.41 | 21.31 | 20.41 | 20.42 | 20.31 | 21.3 | 21.4 | |
| 22.5 | 20.43 | 22.12 | 21.3 | 20.44 | 20.4 | 21.41 | 21.32 | |
| 15 | 21.32 | 21.42 | 23.2 | 19.32 | 21.3 | 21.41 | 22.4 | |
| 7.5 | 22.41 | 22.32 | 23.41 | 21.3 | 22.31 | 22.2 | 23.41 | |
| 1.2 | 26.31 | 24.4 | 24.42 | 23.4 | 24.4 | 23.31 | 24.4 | |

Tabel kenaikan elevasi dasar sungai

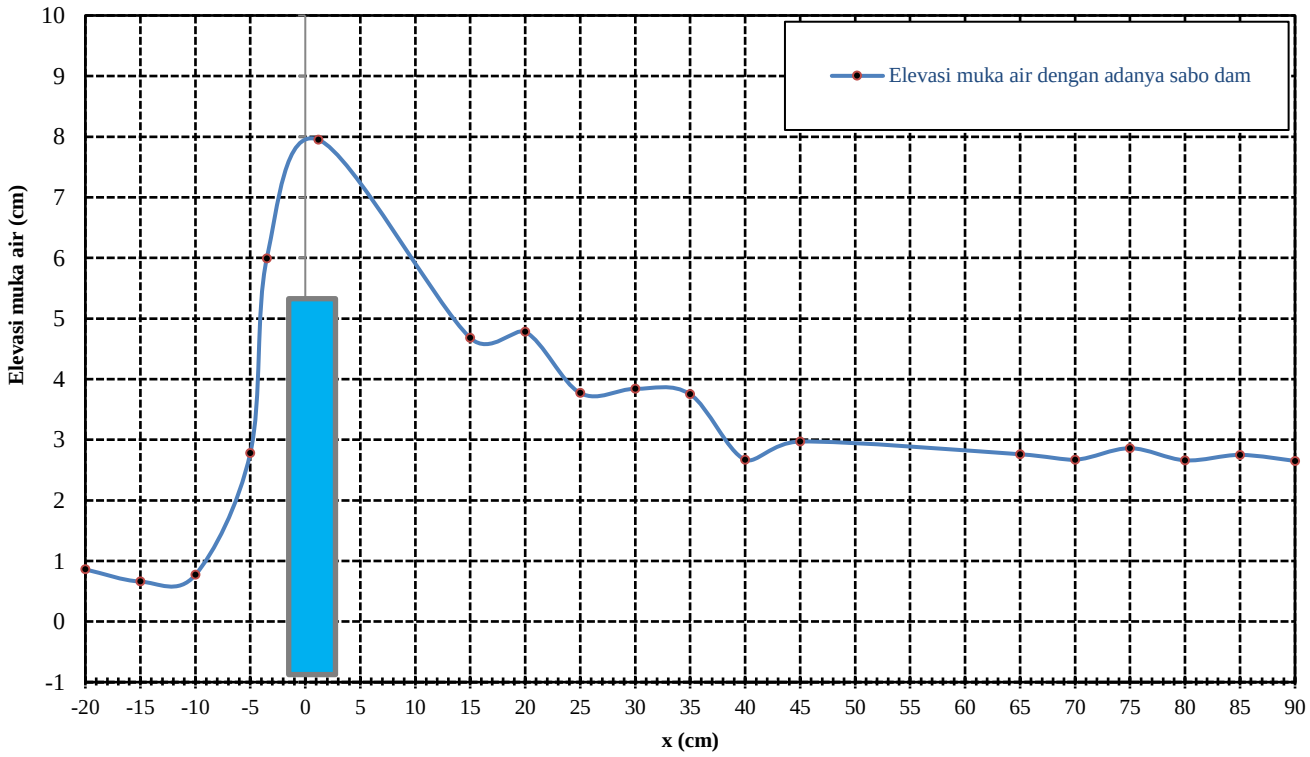
| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 |
|---|---|---|---|---|---|---|---|
| 28 | -0.03 | -1.36 | -1.29 | -0.47 | -1.45 | 0.61 | -0.36 |
| 22.5 | -0.43 | -1.06 | -0.14 | -0.22 | -0.26 | 0.86 | 2.74 |
| 15 | -1.49 | -2.03 | -1.26 | -0.97 | -0.49 | 6.86 | 6.93 |
| 7.5 | -1.09 | -1.47 | -0.30 | -1.20 | -1.14 | 8.57 | 7.74 |
| 1.2 | -0.94 | -1.28 | -1.09 | -0.38 | -0.13 | 6.92 | 6.95 |

| Y [cm] \ X' [cm] | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|
| 28 | -0.14 | -0.45 | 0.52 | 0.83 | 1.93 | 3.77 | 4.01 | 6.60 |
| 22.5 | 4.68 | 3.52 | 3.71 | 3.79 | 5.67 | 5.72 | 6.93 | 6.70 |
| 15 | 7.71 | 6.90 | 7.84 | 6.74 | 6.92 | 5.79 | 5.49 | 6.71 |
| 7.5 | 7.06 | 5.87 | 5.62 | 5.73 | 6.07 | 4.60 | 4.92 | 4.59 |
| 1.2 | 7.01 | 5.85 | 4.77 | 3.73 | 4.76 | 3.82 | 3.03 | 2.91 |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 |
|---|---|---|---|---|---|---|---|
| 28 | 7.66 | 6.74 | 6.84 | 5.77 | 8.91 | 6.76 | |
| 22.5 | 6.77 | 7.66 | 7.66 | 4.74 | 6.68 | 7.66 | |
| 15 | 5.66 | 6.72 | 5.68 | 6.87 | 5.68 | 5.87 | |
| 7.5 | 3.91 | 2.67 | 4.96 | 4.76 | 4.75 | 5.65 | |
| 1.2 | -0.34 | 0.76 | 0.97 | 0.66 | 1.68 | 1.67 | |

| Y [cm] \ X' [cm] | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|
| 28 | 6.67 | 5.77 | 6.67 | 6.66 | 6.77 | 5.78 | 5.68 | |
| 22.5 | 6.65 | 4.96 | 5.78 | 6.64 | 6.68 | 5.67 | 5.76 | |
| 15 | 5.76 | 5.66 | 3.88 | 7.76 | 5.78 | 5.67 | 4.68 | |
| 7.5 | 4.67 | 4.76 | 3.67 | 5.78 | 4.77 | 4.88 | 3.67 | |
| 1.2 | 0.77 | 2.68 | 2.66 | 3.68 | 2.68 | 3.77 | 2.68 | |

# GRAFIK KENAIKAN ELEVASI MUKA AIR



## TABEL PERHITUNGAN BERAT JENIS

HARI/TANGGAL :
JUMLAH SAMPEL :

| NO | EKSPERIMEN I | SAMPLE | JUMLAH KAYU YANG DIHANYUTKAN | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 10 | 9 | 8 | 7 | 6 | 5 |
| 1. | BERAT (gram) | 1 | 6.123 | 7.800 | 7.122 | 5.143 | 5.256 | 2.237 |
| | | 2 | 9.844 | 7.037 | 6.066 | 4.913 | 2.286 | 3.391 |
| | | 3 | 8.431 | 8.834 | 4.823 | 3.989 | 4.069 | 2.237 |
| | | | | | | | | |
| 2. | Diameter Kayu ($cm^2$) | 1 | 0.60 | 0.60 | 0.60 | 0.60 | 0.60 | 0.60 |
| | | 2 | 0.60 | 0.60 | 0.60 | 0.60 | 0.60 | 0.60 |
| | | 3 | 0.60 | 0.60 | 0.60 | 0.60 | 0.60 | 0.60 |
| | D Rata-Rata | | 0.60 | 0.60 | 0.60 | 0.60 | 0.60 | 0.60 |
| | | | | | | | | |
| 3. | Volume Kayu ($cm^3$) | 1 | 4.71 | 4.24 | 3.80 | 3.30 | 2.83 | 2.35 |
| | | 2 | 4.71 | 4.24 | 3.80 | 3.30 | 2.83 | 2.35 |
| | | 3 | 4.71 | 4.24 | 3.80 | 3.30 | 2.83 | 2.35 |
| | V Rata-Rata | | 4.71 | 4.24 | 3.80 | 3.30 | 2.83 | 2.35 |
| | | | | | | | | |

*CATATAN* :

## Tabel Diameter Batu Sebagai Sedimen

| No | Diameter Batu | | |
|---|---|---|---|
| | Sisi 1<br>cm | Sisi 2<br>cm | Sisi 3<br>cm |
| 1 | 1.51 | 0.89 | 1.22 |
| 2 | 1.14 | 1.57 | 0.94 |
| 3 | 1.31 | 0.93 | 0.84 |
| 4 | 1.17 | 1.10 | 0.76 |
| 5 | 1.17 | 0.99 | 0.88 |
| 6 | 1.22 | 0.87 | 1.06 |
| 7 | 1.50 | 1.17 | 1.15 |
| 8 | 1.22 | 1.19 | 1.40 |
| 9 | 1.58 | 1.17 | 1.41 |
| 10 | 1.72 | 1.28 | 1.17 |
| Diameter rata-rata | 1.18 | | |

# Tabel Hasil Perhitungan Kenaikan Muka Air

| Eksperimen | sabo dam | $q_o$ ($cm^2/s$) inflow | q ($cm^2/s$) outflow | | Hulu | | Hilir | | $\Delta H^j_{ud}$ : $H^j_u$-$H^j_d$ |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Saat kayu tertahan | | Saat kayu tertahan | | |
| | | | | | $H^j_u$ | v (cm/s) = q/$H^j_u$ | $H^j_d$ | v (cm/s) = q/$H^j_d$ | |
| 1 | SB | 90 | 1 | 90 | 6.05 | 14.88 | 0.78 | 115.38 | 5.27 |
| 2 | SB | 85 | 1 | 85 | 6.05 | 14.05 | 0.65 | 130.77 | 5.40 |
| 3 | SB | 116 | 1 | 116 | 5.96 | 19.46 | 1.06 | 109.43 | 4.90 |
| 4 | SB | 122 | 1 | 122 | 6.94 | 17.58 | 1.23 | 99.19 | 5.71 |
| 5 | SB | 102 | 1 | 102 | 6.05 | 16.86 | 1.06 | 96.23 | 4.99 |
| 6 | SB | 84 | 1 | 84 | 4.77 | 17.61 | 0.63 | 133.33 | 4.14 |
| 7 | SB | 63 | 1 | 63 | 4.67 | 13.49 | 0.13 | 484.62 | 4.54 |
| 8 | SB | 107 | 1 | 107 | 5.77 | 18.54 | 1.09 | 98.17 | 4.68 |
| 9 | SB | 235 | 1 | 235 | 8.87 | 26.49 | -0.34 | -691.18 | 9.21 |
| 10 | SB | 174 | 1 | 174 | 7.95 | 21.89 | 1.91 | 91.10 | 6.04 |

# Tabel Hasil Perhitungan Loss Koefisien

| Eksperimen | $h^j_u$ | $v^j_u$ | $h^j_d$ | $v^j_d$ | $(v^j_u)^2$ | 2g | $(v^j_d)^2$ | 2g | $(v^j_u)^2/2g$ | $(v^j_d)^2/2g$ | $(v^j_u)^2/2g + h^j_u$ | $(v^j_d)^2/2g + h^j_d$ | $(v^j_u)^2/2g + h^j_u$ minus $(v^j_d)^2/2g + h^j_d$ | $((v^j_u)^2/2g + h^j_u - (v^j_d)^2/2g + h^j_d) / (v^j_d)^2/2g$ | $f^j_d$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 6.05 | 14.876 | 0.78 | 115.385 | 221.296 | 1960 | 13313.6 | 1960 | 0.112906 | 6.792658 | 6.162906306 | 7.572657892 | -1.409751586 | -0.207540496 | -0.2075 |
| | | | | | | | | | | | | | | | |
| 2 | 6.05 | 14.05 | 0.65 | 130.769 | 197.391 | 1960 | 17100.6 | 1960 | 0.10071 | 8.724792 | 6.150709637 | 9.374791692 | -3.224082055 | -0.369531121 | -0.3695 |
| | | | | | | | | | | | | | | | |
| 3 | 5.96 | 19.463 | 1.06 | 109.434 | 378.812 | 1960 | 11975.8 | 1960 | 0.193271 | 6.110098 | 6.153271309 | 7.170098009 | -1.0168267 | -0.166417412 | -0.1664 |
| | | | | | | | | | | | | | | | |
| 4 | 6.94 | 17.579 | 1.23 | 99.187 | 309.03 | 1960 | 9838.06 | 1960 | 0.157668 | 5.019418 | 7.097668396 | 6.249418039 | 0.848250357 | 0.168993766 | 0.16899 |
| | | | | | | | | | | | | | | | |
| 5 | 6.05 | 16.86 | 1.06 | 96.2264 | 284.243 | 1960 | 9259.52 | 1960 | 0.145022 | 4.724246 | 6.195021877 | 5.784246409 | 0.410775468 | 0.086950475 | 0.08695 |
| | | | | | | | | | | | | | | | |
| 6 | 4.77 | 17.61 | 0.63 | 133.333 | 310.114 | 1960 | 17777.8 | 1960 | 0.158222 | 9.070295 | 4.928221589 | 9.700294785 | -4.772073195 | -0.52612107 | -0.5261 |
| | | | | | | | | | | | | | | | |
| 7 | 4.67 | 13.49 | 0.13 | 484.615 | 181.99 | 1960 | 234852 | 1960 | 0.092852 | 119.8225 | 4.762852001 | 119.9524852 | -115.1896332 | -0.961335704 | -0.9613 |
| | | | | | | | | | | | | | | | |
| 8 | 5.77 | 18.544 | 1.09 | 98.1651 | 343.887 | 1960 | 9636.39 | 1960 | 0.175453 | 4.916528 | 5.94545262 | 6.006527675 | -0.061075055 | -0.012422396 | -0.0124 |
| | | | | | | | | | | | | | | | |
| 9 | 8.87 | 26.49 | -0.34 | -691.18 | 701.72 | 1960 | 477725 | 1960 | 0.35802 | 243.7372 | 9.228020459 | 243.3972008 | -234.1691803 | -0.960744521 | -0.9607 |
| | | | | | | | | | | | | | | | |
| 10 | 7.95 | 21.89 | 1.91 | 91.0995 | 479.172 | 1960 | 8299.11 | 1960 | 0.244476 | 4.234242 | 8.194475561 | 6.144242147 | 2.050233414 | 0.484203157 | 0.4842 |

Tabel Dimensi pohon Hasil Survey

| Sisi kiri sungai | | | Sisi kanan sungai | | |
|---|---|---|---|---|---|
| Pohon | Diameter(cm) | Tinggi(m) | Pohon | Diameter (cm) | Tinggi (m) |
| 1 | 60 | 15 | 1 | 45 | 7 |
| 2 | 17 | 6.8 | 2 | 48 | 9 |
| 3 | 13 | 7.2 | 3 | 15 | 7 |
| 4 | 80 | 15 | 4 | 30 | 3.8 |
| 5 | 105 | 15 | Rata-rata | 35 | 7 |
| 6 | 9 | 3.5 | | | |
| 7 | 40 | 7 | | | |
| 8 | 9 | 3.4 | | | |
| 9 | 14 | 7 | | | |
| 10 | 25 | 11 | | | |
| 11 | 15 | 10 | | | |
| 12 | 20 | 4.2 | | | |
| 13 | 20 | 10.5 | | | |
| 14 | 75 | 3 | | | |
| 15 | 18 | 6.4 | | | |
| Rata-rata | 35 | 8 | | | |

rata-rata tinggi pohon 7.517 m

PENGUKURAN ELEVASI TANPA SABODAM DEBIT 90 cm2/s

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | | | | | | | | |
| 22.5 | | | | | | | | | | | | | | | |
| 15 | 26.23 | 26.29 | 26 | 26.04 | 26.17 | 26.03 | 26.44 | 26.55 | 26.13 | 26.29 | 26.25 | 26.22 | 26.3 | 26.66 | 26.66 |
| 7.5 | | | | | | | | | | | | | | | |
| 1.2 | | | | | | | | | | | | | | | |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | | | | | | | | |
| 22.5 | | | | | | | | | | | | | | | |
| 15 | 26.26 | 26.1 | 26.1 | 26.28 | 26.26 | 26.27 | | 26.2 | 26.36 | 26.49 | 26.59 | 26.64 | 26.15 | 26.15 | |
| 7.5 | | | | | | | | | | | | | | | |
| 1.2 | | | | | | | | | | | | | | | |

PENGUKURAN ELEVASI TANPA SABODAM DEBIT 85 cm2/s

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | | | | | | | | |
| 22.5 | | | | | | | | | | | | | | | |
| 15 | 26.23 | 26.29 | 26 | 26.04 | 26.17 | 26.03 | 26.44 | 26.55 | 26.13 | 26.29 | 26.25 | 26.22 | 26.3 | 26.66 | 26.66 |
| 7.5 | | | | | | | | | | | | | | | |
| 1.2 | | | | | | | | | | | | | | | |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | | | | | | | | |
| 22.5 | | | | | | | | | | | | | | | |
| 15 | 26.26 | 26.1 | 26.4 | 26.48 | 26.46 | 26.57 | | 26.52 | 26.66 | 26.69 | 26.79 | 26.95 | 26.95 | 26.98 | |
| 7.5 | | | | | | | | | | | | | | | |
| 1.2 | | | | | | | | | | | | | | | |

PENGUKURAN ELEVASI TANPA SABODAM DEBIT 116 cm2/s

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | | | | | | | | |
| 22.5 | | | | | | | | | | | | | | | |
| 15 | 25.63 | 25.79 | 25.89 | 25.74 | 25.57 | 25.53 | 25.54 | 25.85 | 25.45 | 25.45 | 26.05 | 26.02 | 26.3 | 26.36 | 26.36 |
| 7.5 | | | | | | | | | | | | | | | |
| 1.2 | | | | | | | | | | | | | | | |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | | | | | | | | |
| 22.5 | | | | | | | | | | | | | | | |
| 15 | 26.26 | 26.1 | 26.4 | 26.18 | 26.26 | 26.27 | | 26.22 | 26.16 | 26.19 | 26.19 | 26.25 | 26.25 | 26.18 | |
| 7.5 | | | | | | | | | | | | | | | |
| 1.2 | | | | | | | | | | | | | | | |

PENGUKURAN ELEVASI TANPA SABODAM DEBIT 122 cm2/s

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | | | | | | | | |
| 22.5 | | | | | | | | | | | | | | | |
| 15 | 25.63 | 25.79 | 25.89 | 25.74 | 25.57 | 25.53 | 25.54 | 25.85 | 25.45 | 25.45 | 25.35 | 25.12 | 25.3 | 25.36 | 25.36 |
| 7.5 | | | | | | | | | | | | | | | |
| 1.2 | | | | | | | | | | | | | | | |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | | | | | | | | |
| 22.5 | | | | | | | | | | | | | | | |
| 15 | 26.26 | 26.1 | 26.4 | 26.18 | 26.26 | 26.27 | | 26.22 | 26.16 | 26.19 | 26.19 | 26.25 | 26.25 | 26.18 | |
| 7.5 | | | | | | | | | | | | | | | |
| 1.2 | | | | | | | | | | | | | | | |

PENGUKURAN ELEVASI TANPA SABODAM DEBIT 102 cm2/s

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | | | | | | | | |
| 22.5 | | | | | | | | | | | | | | | |
| 15 | 25.63 | 25.79 | 25.89 | 25.74 | 25.57 | 25.53 | 25.54 | 25.85 | 25.45 | 25.45 | 26.05 | 26.02 | 26.3 | 26.36 | 26.36 |
| 7.5 | | | | | | | | | | | | | | | |
| 1.2 | | | | | | | | | | | | | | | |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | | | | | | | | |
| 22.5 | | | | | | | | | | | | | | | |
| 15 | 26.46 | 26.3 | 26.4 | 26.28 | 26.36 | 26.27 | | 26.22 | 26.16 | 26.19 | 26.19 | 26.25 | 26.25 | 26.18 | |
| 7.5 | | | | | | | | | | | | | | | |
| 1.2 | | | | | | | | | | | | | | | |

PENGUKURAN ELEVASI TANPA SABODAM DEBIT 84 cm2/s

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | | | | | | | | |
| 22.5 | | | | | | | | | | | | | | | |
| 15 | 26.23 | 26.29 | 26.35 | 26.24 | 26.17 | 26.03 | 26.44 | 26.55 | 26.13 | 26.29 | 26.25 | 26.22 | 26.3 | 26.66 | 26.66 |
| 7.5 | | | | | | | | | | | | | | | |
| 1.2 | | | | | | | | | | | | | | | |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | | | | | | | | |
| 22.5 | | | | | | | | | | | | | | | |
| 15 | 26.26 | 26.1 | 26.4 | 26.48 | 26.46 | 26.57 | | 26.52 | 26.66 | 26.69 | 26.79 | 26.95 | 26.95 | 26.98 | |
| 7.5 | | | | | | | | | | | | | | | |
| 1.2 | | | | | | | | | | | | | | | |

PENGUKURAN ELEVASI TANPA SABODAM DEBIT 63 cm2/s

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | | | | | | | | |
| 22.5 | | | | | | | | | | | | | | | |
| 15 | 26.23 | 26.29 | 26.35 | 26.24 | 26.37 | 26.23 | 26.44 | 26.55 | 26.23 | 26.29 | 26.55 | 26.52 | 26.6 | 26.66 | 26.66 |
| 7.5 | | | | | | | | | | | | | | | |
| 1.2 | | | | | | | | | | | | | | | |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | | | | | | | | |
| 22.5 | | | | | | | | | | | | | | | |
| 15 | 26.56 | 26.54 | 26.46 | 26.48 | 26.46 | 26.57 | | 27.4 | 27.5 | 27.5 | 26.79 | 26.95 | 26.95 | 26.98 | |
| 7.5 | | | | | | | | | | | | | | | |
| 1.2 | | | | | | | | | | | | | | | |

PENGUKURAN ELEVASI TANPA SABODAM DEBIT 122 cm2/s

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | | | | | | | | |
| 22.5 | | | | | | | | | | | | | | | |
| 15 | 25.63 | 25.79 | 25.89 | 25.74 | 25.57 | 25.53 | 25.54 | 25.85 | 25.45 | 25.45 | 25.35 | 26.12 | 26.3 | 26.36 | 26.36 |
| 7.5 | | | | | | | | | | | | | | | |
| 1.2 | | | | | | | | | | | | | | | |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | | | | | | | | |
| 22.5 | | | | | | | | | | | | | | | |
| 15 | 26.26 | 26.1 | 26.4 | 26.18 | 26.26 | 26.27 | | 26.22 | 26.16 | 26.19 | 26.19 | 26.25 | 26.25 | 26.18 | |
| 7.5 | | | | | | | | | | | | | | | |
| 1.2 | | | | | | | | | | | | | | | |

PENGUKURAN ELEVASI TANPA SABODAM DEBIT 235 cm2/s

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | | | | | | | | |
| 22.5 | | | | | | | | | | | | | | | |
| 15 | 24.63 | 24.79 | 24.89 | 24.74 | 24.57 | 24.53 | 24.54 | 24.85 | 24.45 | 24.45 | 25.15 | 25.12 | 25.3 | 25.36 | 25.36 |
| 7.5 | | | | | | | | | | | | | | | |
| 1.2 | | | | | | | | | | | | | | | |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | | | | | | | | |
| 22.5 | | | | | | | | | | | | | | | |
| 15 | 25.26 | 25.1 | 25.4 | 25.18 | 25.26 | 25.27 | | 25.22 | 25.16 | 25.19 | 25.19 | 25.25 | 25.25 | 25.18 | |
| 7.5 | | | | | | | | | | | | | | | |
| 1.2 | | | | | | | | | | | | | | | |

PENGUKURAN ELEVASI TANPA SABODAM DEBIT 174 cm2/s

| Y [cm] \ X' [cm] | -20 | -15 | -10 | -5 | -3.5 | 1.2 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | | | | | | | | |
| 22.5 | | | | | | | | | | | | | | | |
| 15 | 24.63 | 24.79 | 24.89 | 24.74 | 24.57 | 24.53 | 25.54 | 25.85 | 25.45 | 25.45 | 25.15 | 25.12 | 25.3 | 25.36 | 25.36 |
| 7.5 | | | | | | | | | | | | | | | |
| 1.2 | | | | | | | | | | | | | | | |

| Y [cm] \ X' [cm] | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 | 115 | 120 | 125 | 130 | 135 | 140 | 145 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 28 | | | | | | | | | | | | | | | |
| 22.5 | | | | | | | | | | | | | | | |
| 15 | 25.26 | 25.1 | 25.4 | 25.18 | 25.26 | 25.27 | | 25.22 | 25.16 | 25.19 | 25.19 | 25.25 | 25.25 | 25.18 | |
| 7.5 | | | | | | | | | | | | | | | |
| 1.2 | | | | | | | | | | | | | | | |

# LAMPIRAN III

## A. Survei Lapangan Untuk Pengumpulan Data

Survei lapangan

Batu pada lapangan

Debris kayu pada lapangan

## B. Persiapan Sebelum Melakukan Eksperimen

Memasang sabo dam pada flume

Pasir untuk membuat miniatur bangunan sabodam

Semen sebagai bahan campuran perekat dan pembuatan sabo dam

Lem fox sebagai bahan perekan sabo dam pada flume

Damdex bagan camuran perekat dasar flume

Jangka sorong alat untuk mengukur kedalaman dasar
dan elevasi muka air

Stopwat alat bantu untuk menghitung debit aliran

Ember untuk menghitung debit aliran

Timbangan untuk menimbang berat air dalam ember
(alat bantu untuk menghitung debit aliran)

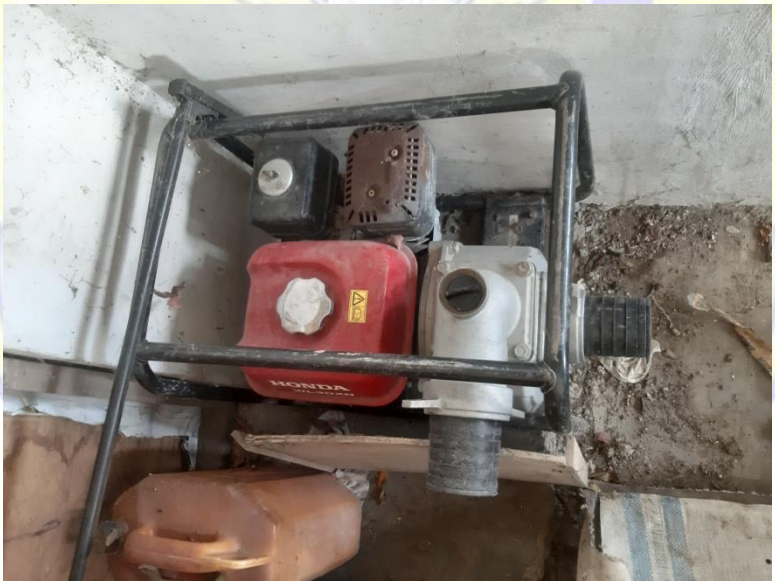
Menaikan elevasi hulu sabo sehingga mencapai nlai i = 0.06 m

Sarung tangan sebagai pengaman dalam melakukan eksperimen

Sepatu bot sebagai pengaman dalam melakukan eksperimen

Saringan halus untuk menahan sedimen yang lolos dari flume

Cawan sebagai wadah merendam debris kayu sebelum di gunakan




Pompa air untung mengaliri air dari sungai
hingga flume untuk eksperimen

Papan kayu untuk memadatkan dasar tidak tetap
setiap ingin memulai kembali eksperimen baru

Flume siap digunakan untuk eksperimen

## C. Tahapan Eksperimen

Mempersiapkan debris yang ingin digunakan
dan direndam selama 15 menit

Menyusun debris sesuai pola yang direncanakan

Menyalan mesin pompa untuk mengaliri air pada flume

Membuka keran dan Mengatur besar kecilnya debit sesuai yang di gunakan

Menunggu debit aliran hingga stabil untuk
menghitung besarnya debit sesuai dengan yang di inginkan
dan semua debris kayu tidak ada yang berpindah lagi

Mengukur besar debit telah sesuai renana atau tidak

Menimbang berat air untuk menghitung debit yang di rencanakan

Mengukur elevasi muka air di hulu dan di hilir sabodam

Mengamati, mengambil dan mencatat deposisi debris
yang terjadi di hulu sabo dam

Mengukur kembali besar kecilnya debit
untuk memastikan debit yang ada telah stabil

Mematikan mesin air dan memulai pengukuran elevasi dasar flume sebangai pengukuran terakhir

Meratakan kembali dasar flume agar bias digunakan untuk eksperimen selanjutnya

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