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Discharge Measurements Formulas

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List of 10 Discharge Measurements Formulas

Discharge Measurements

Measurement Methods

1) Mean River Velocity in Float Method

Open Calculator

fx $v = 0.85 \cdot v_{surface}$

ex $2.227\text{m/s} = 0.85 \cdot 2.62\text{m/s}$

2) Surface Velocity of River in Float Method

Open Calculator

fx $v_{surface} = \frac{v}{0.85}$

ex $2.62\text{m/s} = \frac{2.227\text{m/s}}{0.85}$

Manning's Equation

3) Hydraulic radius in Manning's formula

Open Calculator

fx $r_H = \frac{A}{P}$

ex $0.15\text{m} = \frac{12.0\text{m}^2}{80\text{m}}$

4) Hydraulic Radius using Manning Equation

Open Calculator

fx $$r_H = \left(\frac{v \cdot n}{S^{\frac{1}{2}}} \right)^{\frac{3}{2}}$$

ex $$0.310729\text{m} = \left(\frac{2.227\text{m/s} \cdot 0.412}{(4.0)^{\frac{1}{2}}} \right)^{\frac{3}{2}}$$

5) Manning's Equation

Open Calculator

fx $$v = \left(\frac{1}{n} \right) \cdot (r_H)^{\frac{2}{3}} \cdot (S)^{\frac{1}{2}}$$

ex $$1.822292\text{m/s} = \left(\frac{1}{0.412} \right) \cdot (0.23\text{m})^{\frac{2}{3}} \cdot (4.0)^{\frac{1}{2}}$$

6) Slope of Gradient of Stream Bed given Discharge in Manning's Equation

Open Calculator

fx $$S = \left(\frac{v \cdot n}{r_H^{\frac{2}{3}}} \right)^2$$

ex $$5.973989 = \left(\frac{2.227\text{m/s} \cdot 0.412}{(0.23\text{m})^{\frac{2}{3}}} \right)^2$$

Tracer Method (Instantaneous Injection)

7) Estimated Distance given Channel Width

Open Calculator

$$L = \frac{100 \cdot W^2}{d}$$

$$51.81347\text{m} = \frac{100 \cdot (10\text{m})^2}{193\text{m}}$$

8) Estimated Distance given Discharge in Tracer Method

Open Calculator

$$L = 50 \cdot \sqrt{Q}$$

$$52.44044\text{m} = 50 \cdot \sqrt{1.1\text{m}^3/\text{s}}$$

9) Water Table Depth given Distance in Tracer Method

Open Calculator

$$d = \frac{100 \cdot W^2}{L}$$

$$192.3077\text{m} = \frac{100 \cdot (10\text{m})^2}{52\text{m}}$$

Water Height Relationships

10) Water Depth given Flow Velocity in Continuous Discharge Measurements

Open Calculator

fx $$d = \left(\frac{v}{0.00198}\right)^{\frac{1}{1.3597}} + 17.7$$

ex $$193.0549\text{m} = \left(\frac{2.227\text{m/s}}{0.00198}\right)^{\frac{1}{1.3597}} + 17.7$$

Variables Used

- **A** Cross-Sectional Area *(Square Meter)*
- **d** Water Depth as Indicated by the Scale *(Meter)*
- **L** Estimated Distance *(Meter)*
- **n** Manning's Roughness Coefficient
- **P** Wetted Perimeter *(Meter)*
- **Q** Discharge *(Cubic Meter per Second)*
- r_H Hydraulic Radius *(Meter)*
- $\bar{S}$ Bed Slope
- **v** Stream Velocity *(Meter per Second)*
- $v_{surface}$ Flow Velocity at the Surface *(Meter per Second)*
- **W** Channel Width *(Meter)*

Constants, Functions, Measurements used

- Function: **sqrt**, sqrt(Number)
  A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Area** in Square Meter (m²)
  Area Unit Conversion
- Measurement: **Speed** in Meter per Second (m/s)
  Speed Unit Conversion
- Measurement: **Volumetric Flow Rate** in Cubic Meter per Second (m³/s)
  Volumetric Flow Rate Unit Conversion

Check other formula lists

- **Abstractions from Precipitation Formulas**
- **Area-Velocity and Ultrasonic Method of Streamflow Measurement Formulas**
- **Discharge Measurements Formulas**
- **Indirect Methods of Streamflow Measurement Formulas**
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