calculatoratoz.com

unitsconverters.com

Inlet Currents and Tidal Elevations Formulas

Calculators! Examples! Conversions!

Bookmark **calculatoratoz.com**, **unitsconverters.com**

Widest Coverage of Calculators and Growing - **30,000+ Calculators!**
Calculate With a Different Unit for Each Variable - **In built Unit Conversion!**
Widest Collection of Measurements and Units - **250+ Measurements!**

Feel free to SHARE this document with your friends!

Please leave your feedback here...

List of 28 Inlet Currents and Tidal Elevations Formulas

Inlet Currents and Tidal Elevations

1) Average Area over Channel Length for Flow through Inlet into Bay

Open Calculator

fx $$A_{avg} = \frac{A_b \cdot d_{Bay}}{V_{avg}}$$

ex $$8.000533\text{m}^2 = \frac{1.5001\text{m}^2 \cdot 20}{3.75\text{m/s}}$$

2) Average Area over Channel Length using King's Dimensionless Velocity

Open Calculator

fx $$A_{avg} = \frac{V'_m \cdot 2 \cdot \pi \cdot a_o \cdot A_b}{T \cdot V_m}$$

ex $$7.780823\text{m}^2 = \frac{110 \cdot 2 \cdot \pi \cdot 4.0\text{m} \cdot 1.5001\text{m}^2}{130\text{s} \cdot 4.1\text{m/s}}$$

3) Average Velocity in Channel for Flow through Inlet into Bay

Open Calculator

fx $$V_{avg} = \frac{A_b \cdot d_{Bay}}{A_{avg}}$$

ex $$3.75025\text{m/s} = \frac{1.5001\text{m}^2 \cdot 20}{8\text{m}^2}$$

4) Bay Tide Amplitude given Tidal Prism Filling Bay

Open Calculator

fx $$a_B = \frac{P}{2 \cdot A_b}$$

ex $$10.66596 = \frac{32\text{m}^3}{2 \cdot 1.5001\text{m}^2}$$

5) Change of Bay Elevation with Time for Flow through Inlet into Bay

Open Calculator

fx $$d_{Bay} = \frac{A_{avg} \cdot V_{avg}}{A_b}$$

ex $$19.99867 = \frac{8\text{m}^2 \cdot 3.75\text{m/s}}{1.5001\text{m}^2}$$

6) Darcy - Weisbach Friction Term given Inlet Impedance

Open Calculator

fx $$f = \frac{4 \cdot r_H \cdot (F - K_{en} - K_{ex})}{L}$$

ex $$0.02999 = \frac{4 \cdot 0.33\text{m} \cdot (2.246 - 1.01 - 0.1)}{50\text{m}}$$

7) Dimensionless Parameter Function of Hydraulic Radius and Manning's Roughness Coefficient

Open Calculator

fx $$f = \frac{116 \cdot n^2}{R_H^{\frac{1}{3}}}$$

ex $$0.029811 = \frac{116 \cdot (0.0198)^2}{(3.55\text{m})^{\frac{1}{3}}}$$

8) Duration of Inflow given Inlet Channel Velocity

Open Calculator

fx $$t = \frac{a \sin\left(\frac{c_1}{V_m}\right) \cdot T}{2 \cdot \pi}$$

ex $$0.007821\text{h} = \frac{a \sin\left(\frac{4.01\text{m/s}}{4.1\text{m/s}}\right) \cdot 130\text{s}}{2 \cdot \pi}$$

9) Entrance Energy Loss Coefficient given Inlet Impedance

Open Calculator

fx $$K_{en} = F - K_{ex} - \left(f \cdot \frac{L}{4 \cdot r_H}\right)$$

ex $$1.009636 = 2.246 - 0.1 - \left(0.03 \cdot \frac{50\text{m}}{4 \cdot 0.33\text{m}}\right)$$

10) Exit Energy Loss Coefficient given Inlet Impedance

Open Calculator

fx $$K_{ex} = F - K_{en} - \left(f \cdot \frac{L}{4 \cdot r_H}\right)$$

ex $$0.099636 = 2.246 - 1.01 - \left(0.03 \cdot \frac{50\text{m}}{4 \cdot 0.33\text{m}}\right)$$

11) Hydraulic Radius given Dimensionless Parameter

Open Calculator

fx $$R_H = \left(116 \cdot \frac{n^2}{f}\right)^3$$

ex $$3.483384\text{m} = \left(116 \cdot \frac{(0.0198)^2}{0.03}\right)^3$$

12) Inlet Channel Velocity

Open Calculator

fx $$c_1 = V_m \cdot \sin\left(2 \cdot \pi \cdot \frac{t}{T}\right)$$

ex $$4.070106\text{m/s} = 4.1\text{m/s} \cdot \sin\left(2 \cdot \pi \cdot \frac{1.2\text{h}}{130\text{s}}\right)$$

13) Inlet Friction Coefficient given Keulegan Repletion Coefficient

Open Calculator

fx $$K_1 = \frac{1}{(K \cdot K_2)^2}$$

ex $$28.44444 = \frac{1}{(0.75 \cdot 0.25)^2}$$

14) Inlet Friction Coefficient Parameter given Keulegan Repletion Coefficient

Open Calculator

fx $$K_2 = \frac{\sqrt{\frac{1}{K_1}}}{K}$$

ex $$0.248452 = \frac{\sqrt{\frac{1}{28.8}}}{0.75}$$

15) Inlet Hydraulic Radius given Inlet Impedance

Open Calculator

fx $$r_H = \frac{f \cdot L}{4 \cdot (F - K_{ex} - K_{en})}$$

ex $$0.330106\text{m} = \frac{0.03 \cdot 50\text{m}}{4 \cdot (2.246 - 0.1 - 1.01)}$$

16) Inlet Impedance

Open Calculator

fx $$F = K_{en} + K_{ex} + \left(f \cdot \frac{L}{4 \cdot r_H}\right)$$

ex $$2.246364 = 1.01 + 0.1 + \left(0.03 \cdot \frac{50\text{m}}{4 \cdot 0.33\text{m}}\right)$$

17) Inlet Length given Inlet Impedance

Open Calculator

fx $$L = 4 \cdot r_H \cdot \frac{F - K_{ex} - K_{en}}{f}$$

ex $$49.984\text{m} = 4 \cdot 0.33\text{m} \cdot \frac{2.246 - 0.1 - 1.01}{0.03}$$

18) Keulegan Repletion Coefficient

Open Calculator

fx $$K = \frac{1}{K_2} \cdot \sqrt{\frac{1}{K_1}}$$

ex $$0.745356 = \frac{1}{0.25} \cdot \sqrt{\frac{1}{28.8}}$$

19) King's Dimensionless Velocity

Open Calculator

fx $$V'_m = \frac{A_{avg} \cdot T \cdot V_m}{2 \cdot \pi \cdot a_o \cdot A_b}$$

ex $$113.0986 = \frac{8\text{m}^2 \cdot 130\text{s} \cdot 4.1\text{m/s}}{2 \cdot \pi \cdot 4.0\text{m} \cdot 1.5001\text{m}^2}$$

© calculatoratoz.com. A softusvista inc. venture!

20) Manning's Roughness Coefficient using Dimensionless Parameter

Open Calculator

fx $$n = \sqrt{f \cdot \frac{R_H^{\frac{1}{3}}}{116}}$$

ex $$0.019863 = \sqrt{0.03 \cdot \frac{(3.55\text{m})^{\frac{1}{3}}}{116}}$$

21) Maximum Cross-Sectionally Averaged Velocity during Tidal Cycle

Open Calculator

fx $$V_m = \frac{V'_m \cdot 2 \cdot \pi \cdot a_o \cdot A_b}{A_{avg} \cdot T}$$

ex $$3.987672\text{m/s} = \frac{110 \cdot 2 \cdot \pi \cdot 4.0\text{m} \cdot 1.5001\text{m}^2}{8\text{m}^2 \cdot 130\text{s}}$$

22) Maximum Cross-Sectionally Averaged Velocity during Tidal Cycle given Inlet Channel Velocity

Open Calculator

fx $$V_m = \frac{c_1}{\sin\left(2 \cdot \pi \cdot \frac{t}{T}\right)}$$

ex $$4.039452\text{m/s} = \frac{4.01\text{m/s}}{\sin\left(2 \cdot \pi \cdot \frac{1.2\text{h}}{130\text{s}}\right)}$$

23) Ocean Tide Amplitude using King's Dimensionless Velocity

Open Calculator

fx $$a_o = \frac{A_{avg} \cdot V_m \cdot T}{V'_m \cdot 2 \cdot \pi \cdot A_b}$$

ex $$4.112675\text{m} = \frac{8\text{m}^2 \cdot 4.1\text{m/s} \cdot 130\text{s}}{110 \cdot 2 \cdot \pi \cdot 1.5001\text{m}^2}$$

24) Surface Area of Bay for Flow through Inlet into Bay

Open Calculator

fx $$A_b = \frac{V_{avg} \cdot A_{avg}}{d_{Bay}}$$

ex $$1.5\text{m}^2 = \frac{3.75\text{m/s} \cdot 8\text{m}^2}{20}$$

25) Surface Area of Bay given Tidal Prism Filling Bay

Open Calculator

fx $$A_b = \frac{P}{2 \cdot a_B}$$

ex $$4.324324\text{m}^2 = \frac{32\text{m}^3}{2 \cdot 3.7}$$

26) Surface Area of Bay using King's Dimensionless Velocity

Open Calculator

fx $$A_b = \frac{A_{avg} \cdot T \cdot V_m}{V'_m \cdot 2 \cdot \pi \cdot a_o}$$

ex $$1.542356\text{m}^2 = \frac{8\text{m}^2 \cdot 130\text{s} \cdot 4.1\text{m/s}}{110 \cdot 2 \cdot \pi \cdot 4.0\text{m}}$$

27) Tidal Period using King's Dimensionless Velocity

Open Calculator

fx $$T = \frac{2 \cdot \pi \cdot a_o \cdot A_b \cdot V'_m}{A_{avg} \cdot V_m}$$

ex $$126.4384\text{s} = \frac{2 \cdot \pi \cdot 4.0\text{m} \cdot 1.5001\text{m}^2 \cdot 110}{8\text{m}^2 \cdot 4.1\text{m/s}}$$

28) Tidal Prism Filling Bay

Open Calculator

fx $$P = 2 \cdot a_B \cdot A_b$$

ex $$11.10074\text{m}^3 = 2 \cdot 3.7 \cdot 1.5001\text{m}^2$$

Variables Used

- A_{avg} Average Area over the Channel Length *(Square Meter)*
- a_B Bay Tide Amplitude
- A_b Surface Area of Bay *(Square Meter)*
- a_o Ocean Tide Amplitude *(Meter)*
- c_1 Inlet Velocity *(Meter per Second)*
- d_{Bay} Change of Bay Elevation with Time
- f Dimensionless Parameter
- F Inlet Impedance
- K Keulegan Repletion Coefficient [dimensionless]
- K_1 King's Inlet Friction Coefficient
- K_2 King's 1st Inlet Friction Coefficient
- K_{en} Entrance Energy Loss Coefficient
- K_{ex} Exit Energy Loss Coefficient
- L Inlet Length *(Meter)*
- n Manning's Roughness Coefficient
- P Tidal Prism Filling Bay *(Cubic Meter)*
- r_H Hydraulic Radius *(Meter)*
- R_H Hydraulic Radius of the Channel *(Meter)*
- t Duration of Inflow *(Hour)*
- T Tidal Period *(Second)*
- V_{avg} Average Velocity in Channel for Flow *(Meter per Second)*
- V_m Maximum Cross Sectional Average Velocity *(Meter per Second)*

© calculatoratoz.com. A softusvista inc. venture!

- V'_m King's Dimensionless Velocity

© calculatoratoz.com. A softusvista inc. venture!

Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Function: **asin**, asin(Number)
  The inverse sine function, is a trigonometric function that takes a ratio of two sides of a right triangle and outputs the angle opposite the side with the given ratio.
- Function: **sin**, sin(Angle)
  Sine is a trigonometric function that describes the ratio of the length of the opposite side of a right triangle to the length of the hypotenuse.
- 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: **Time** in Second (s), Hour (h)
  Time Unit Conversion
- Measurement: **Volume** in Cubic Meter (m^3)
  Volume Unit Conversion
- Measurement: **Area** in Square Meter (m^2)
  Area Unit Conversion
- Measurement: **Speed** in Meter per Second (m/s)
  Speed Unit Conversion

Check other formula lists

- **Bay Superelevation, Effect of Freshwater Inflow, Multiple Inlets and Wave-Current Interaction Formulas**
- **Inlet Currents and Tidal Elevations Formulas**

Feel free to SHARE this document with your friends!

PDF Available in

English Spanish French German Russian Italian Portuguese Polish Dutch

4/9/2024 | 9:50:10 AM UTC

Please leave your feedback here...