



### Hydrodynamics of Tidal Inlets-2 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...





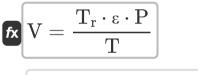
### List of 23 Hydrodynamics of Tidal Inlets-2 Formulas

### Hydrodynamics of Tidal Inlets-2 🕑

# Hydrodynamic and Sediment Interaction at Tidal Inlets C

#### Tidal Dispersion and Mixing 🕑

#### 1) Average Volume of Bay over Tidal Cycle given Residence Time 🗹



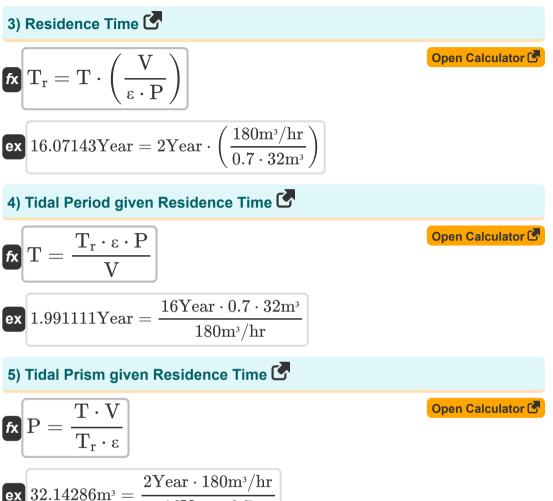
$$179.2 \text{m}^3/\text{hr} = \frac{16 \text{Year} \cdot 0.7 \cdot 32 \text{m}^3}{2 \text{Year}}$$

# 2) Fraction of New Water Entering Bay from Sea each Tidal Cycle given Residence Time

fx 
$$\varepsilon = \frac{V \cdot T}{P \cdot T_r}$$
  
ex  $0.703125 = \frac{180 \text{m}^3/\text{hr} \cdot 2 \text{Year}}{32 \text{m}^3 \cdot 16 \text{Year}}$ 

Open Calculator





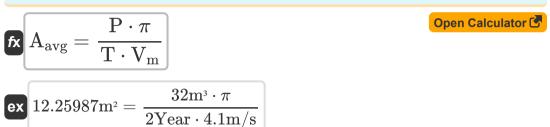
$$32.14286 \mathrm{m}^3 = rac{24 \mathrm{ear} \cdot 180 \mathrm{m}^3 / \mathrm{m}^3}{16 \mathrm{Year} \cdot 0.7}$$



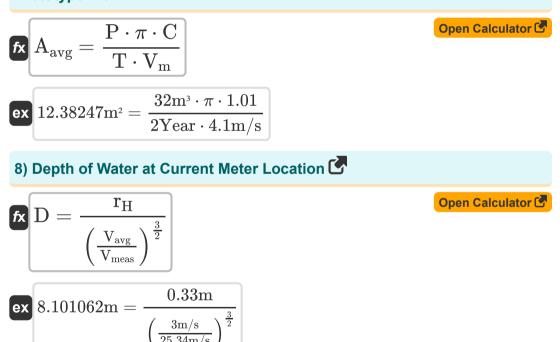


#### Tidal Prism 🕑

#### 6) Average Area over Channel Length given Tidal Prism 💪



# 7) Average Area over Channel Length given Tidal Prism of Non-Sinusoidal Prototype Flow







#### 9) Hydraulic Radius of Entire Cross-Section 🕑

$$\label{eq:rho} \boxed{\mathbf{f_X}} \mathbf{r}_{H} = \mathbf{D} \cdot \left( \frac{V_{avg}}{V_{meas}} \right)^{\frac{3}{2}}$$
 Open Calculator 
$$\boxed{\mathbf{Open Calculator}}$$

10) Maximum Cross-Sectionally Averaged Velocity during Tidal Cycle given Tidal Prism

fx 
$$V_{m} = \frac{P \cdot \pi}{T \cdot A_{avg}}$$
  
ex  $6.283185 \text{m/s} = \frac{32 \text{m}^{3} \cdot \pi}{2 \text{Year} \cdot 8 \text{m}^{2}}$ 

 $^{\prime}$  2Year  $\cdot$  8m<sup>2</sup>

11) Maximum Cross-Sectionally Averaged Velocity given Tidal Prism of Non-sinusoidal Prototype Flow

fx 
$$V_m = \frac{P \cdot \pi \cdot C}{T \cdot A_{avg}}$$
  
ex  $6.346017 \text{m/s} = \frac{32 \text{m}^3 \cdot \pi \cdot 1.01}{2 \text{Year} \cdot 8 \text{m}^2}$ 



#### 12) Maximum Ebb Tide Discharge Accounting for Non-Sinusoidal Character of Prototype Flow by Keulegan

ex 
$$50.26548 \mathrm{m^3/s} = 32 \mathrm{m^3} \cdot rac{\pi}{2 \mathrm{Year}}$$

fx  $V_{\mathrm{avg}} = V_{\mathrm{meas}} \cdot \left(rac{\mathbf{r}_{\mathrm{H}}}{\mathrm{D}}
ight)^{rac{2}{3}}$ 

### 14) Maximum Velocity Averaged over Entire Cross-Section

ex
$$3.000262 \mathrm{m/s} = 25.34 \mathrm{m/s} \cdot \left(rac{0.33 \mathrm{m}}{8.1 \mathrm{m}}
ight)^{rac{2}{3}}$$



#### 15) Point Measurement of Maximum Velocity 🖸

$$\begin{array}{l} \hbox{ (Intersection of the section of the secti$$

# 16) Tidal Period Accounting for Non-sinusoidal Character of Prototype Flow by Keulegan

fx 
$$T = \frac{P \cdot \pi \cdot C}{Q_{max}}$$
  
ex  $2.030725$ Year  $= \frac{32m^3 \cdot \pi \cdot 1.01}{50m^3/s}$ 

# 17) Tidal Period given Maximum Cross-sectionally Averaged Velocity and Tidal Prism

fx 
$$T = \frac{P \cdot \pi}{V_m \cdot A_{avg}}$$
  
ex  $3.064968$ Year  $= \frac{32m^3 \cdot \pi}{4.1m/s \cdot 8m^2}$ 



### 18) Tidal Period given Maximum Instantaneous Ebb Tide Discharge and Tidal Prism

fx 
$$T = \frac{P \cdot \pi}{Q_{max}}$$
 Open Calculator C

ex 
$$2.010619$$
Year  $= \frac{32 \text{m}^3 \cdot \pi}{50 \text{m}^3/\text{s}}$ 

# 19) Tidal Period when Tidal Prism Accounting for Non-sinusoidal Prototype Flow by Keulegan

fx 
$$T = \frac{P \cdot \pi \cdot C}{V_m \cdot A_{avg}}$$
  
ex  $3.095618$ Year  $= \frac{32m^3 \cdot \pi \cdot 1.01}{4.1m/s \cdot 8m^2}$ 

# 20) Tidal Prism Filling Bay Accounting for Non-sinusoidal Prototype Flow

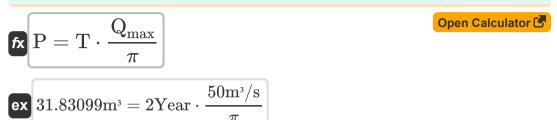
$$\mathbf{fx} \mathbf{P} = \frac{\mathbf{T} \cdot \mathbf{Q}_{\max}}{\pi \cdot \mathbf{C}}$$
Open Calculator **C**

$$\mathbf{x} 31.51583 \mathrm{m}^{3} = \frac{2 \mathrm{Year} \cdot 50 \mathrm{m}^{3} / \mathrm{s}}{\pi \cdot 1.01}$$

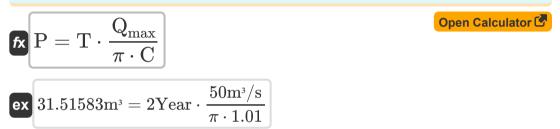




#### 21) Tidal Prism filling Bay given Maximum Ebb Tide Discharge 🕑



# 22) Tidal Prism for Non-sinusoidal character of Prototype Flow by Keulegan



#### 23) Tidal Prism given Average Area over Channel Length 🕑

Open Calculator 🛃

ex 
$$20.88113$$
m<sup>3</sup> =  $\frac{2$ Year  $\cdot 4.1$ m/s  $\cdot 8$ m<sup>2</sup>}{\pi}

 $\mathrm{P} = rac{\mathrm{T} \cdot \mathrm{V_m} \cdot \mathrm{A_{avg}}}{\pi}$ 





### Variables Used

- **A**avg Average Area over the Channel Length (Square Meter)
- C Keulegan Constant for Non-sinusoidal Character
- D Depth of Water at Current Meter Location (Meter)
- **P** Tidal Prism Filling Bay (Cubic Meter)
- Q<sub>max</sub> Maximum Instantaneous Ebb Tide Discharge (Cubic Meter per Second)
- **r<sub>H</sub>** Hydraulic Radius (Meter)
- **T** Tidal Duration (Year)
- **T**<sub>r</sub> Residence Time (Year)
- **V** Average Volume of Bay over Tidal Cycle (*Cubic Meter per Hour*)
- Vavg Max Velocity averaged Over Inlet Cross Section (Meter per Second)
- V<sub>m</sub> Maximum Cross Sectional Average Velocity (Meter per Second)
- Vmeas Point Measurement of Maximum Velocity (Meter per Second)
- E Fraction of New Water entering the Bay



### **Constants, Functions, Measurements used**

- Constant: pi, 3.14159265358979323846264338327950288 Archimedes' constant
- Measurement: Length in Meter (m) Length Unit Conversion
- Measurement: Time in Year (Year) Time Unit Conversion
- Measurement: Volume in Cubic Meter (m<sup>3</sup>) Volume Unit Conversion
- Measurement: Area in Square Meter (m<sup>2</sup>) Area Unit Conversion
- Measurement: Speed in Meter per Second (m/s)
   Speed Unit Conversion
- Measurement: Volumetric Flow Rate in Cubic Meter per Hour (m<sup>3</sup>/hr), Cubic Meter per Second (m<sup>3</sup>/s)
   Volumetric Flow Rate Unit Conversion



### **Check other formula lists**

<ul> <li>Structures Formulas </li> <li>Density Currents in Harbors</li> <li>Formulas </li> <li>Density Currents in Rivers</li> <li>Formulas </li> <li>Dredging Equipment Formulas </li> </ul>	Estimating Marine and Coastal Winds Formulas Hydrodynamic Analysis and Design Conditions Formulas Hydrodynamics of Tidal Inlets-2 Formulas Meteorology and Wave Climate Formulas
---	---

Feel free to SHARE this document with your friends!

### PDF Available in

English Spanish French German Russian Italian Portuguese Polish Dutch

2/19/2024 | 6:20:29 AM UTC

Please leave your feedback here...

