

# Important Wave Transmission Coefficient and Water Surface Amplitude Formulas PDF



**Formulas**  
**Examples**  
**with Units**

## List of 14 Important Wave Transmission Coefficient and Water Surface Amplitude Formulas

### 1) Coefficient for Wave Transmission by Flow over Structure Formula

Formula

$$C_{t0} = \sqrt{C_t^2 - C_{tt}^2}$$

Example

$$0.1501 = \sqrt{0.2775^2 - 0.2334^2}$$

Evaluate Formula

### 2) Coefficient for Wave Transmission through Structure given Combined Transmission Coefficient Formula

Formula

$$C_{tt} = \sqrt{C_t^2 - C_{t0}^2}$$

Example

$$0.2335 = \sqrt{0.2775^2 - 0.15^2}$$

Evaluate Formula

### 3) Combined Wave Transmission Coefficient Formula

Formula

$$C_t = \sqrt{C_{tt}^2 + C_{t0}^2}$$

Example

$$0.2774 = \sqrt{0.2334^2 + 0.15^2}$$

Evaluate Formula

### 4) Dimensionless Coefficient in Seelig Equation Formula

Formula

$$C = 0.51 - \left( \frac{0.11 \cdot B}{h} \right)$$

Example with Units

$$0.37 = 0.51 - \left( \frac{0.11 \cdot 28\text{m}}{22\text{m}} \right)$$

Evaluate Formula

### 5) Dimensionless Coefficient in Seelig Equation for Wave Transmission Coefficient Formula

Formula

$$C = \frac{C_t}{1 - \left( \frac{F}{R} \right)}$$

Example with Units

$$0.37 = \frac{0.2775}{1 - \left( \frac{5\text{m}}{20\text{m}} \right)}$$

Evaluate Formula



## 6) Freeboard for given Wave Transmission Coefficient Formula

Formula

$$F = R \cdot \left( 1 - \left( \frac{C_t}{C} \right) \right)$$

Example with Units

$$5_m = 20_m \cdot \left( 1 - \left( \frac{0.2775}{0.37} \right) \right)$$

Evaluate Formula 

## 7) Incident Wave Height given Surf Similarity Number or Iribarren Number Formula

Formula

$$H_i = L_o \cdot \left( \frac{\tan(\alpha)}{I_r} \right)^2$$

Example with Units

$$160.0785_m = 16_m \cdot \left( \frac{\tan(16.725^\circ)}{0.095} \right)^2$$

Evaluate Formula 

## 8) Incident Wave Height given Water Surface Amplitude Formula

Formula

$$H_i = \frac{N}{\cos\left(\frac{2 \cdot \pi \cdot x}{L_o}\right) \cdot \cos\left(\frac{2 \cdot \pi \cdot t}{T}\right)}$$

Example with Units

$$157.2228_m = \frac{78.78_m}{\cos\left(\frac{2 \cdot 3.1416 \cdot 38.5}{16_m}\right) \cdot \cos\left(\frac{2 \cdot 3.1416 \cdot 12_s}{34_s}\right)}$$

Evaluate Formula 

## 9) Reflected Wave Period given Water Surface Amplitude Formula

Formula

$$T = \frac{2 \cdot \pi \cdot t}{\arccos\left(\frac{N}{H_i \cdot \cos\left(\frac{2 \cdot \pi \cdot x}{L_o}\right)}\right)}$$

Example with Units

$$34.2012_s = \frac{2 \cdot 3.1416 \cdot 12_s}{\arccos\left(\frac{78.78_m}{160_m \cdot \cos\left(\frac{2 \cdot 3.1416 \cdot 38.5}{16_m}\right)}\right)}$$

Evaluate Formula 

## 10) Surf Similarity Number or Iribarren Number Formula

Formula

$$I_r = \frac{\tan(\alpha)}{\sqrt{\frac{H_i}{L_o}}}$$

Example with Units

$$0.095 = \frac{\tan(16.725^\circ)}{\sqrt{\frac{160_m}{16_m}}}$$

Evaluate Formula 



## 11) Time Elapsed given Water Surface Amplitude Formula

Formula

$$t = T \cdot \frac{\alpha \cos\left(\frac{N}{H_i \cdot \cos\left(\frac{2 \cdot \pi \cdot x}{L_o}\right)}\right)}{2 \cdot \pi}$$

Example with Units

$$11.9294 \text{ s} = 34 \text{ s} \cdot \frac{78.78 \text{ m}}{160 \text{ m} \cdot \cos\left(\frac{2 \cdot 3.1416 \cdot 38.5}{16 \text{ m}}\right)} \cdot \frac{1}{2 \cdot 3.1416}$$

Evaluate Formula 

## 12) Water Surface Amplitude Formula

Formula

$$N = H_i \cdot \cos\left(\frac{2 \cdot \pi \cdot x}{L_o}\right) \cdot \cos\left(\frac{2 \cdot \pi \cdot t}{T}\right)$$

Example with Units

$$80.1716 \text{ m} = 160 \text{ m} \cdot \cos\left(\frac{2 \cdot 3.1416 \cdot 38.5}{16 \text{ m}}\right) \cdot \cos\left(\frac{2 \cdot 3.1416 \cdot 12 \text{ s}}{34 \text{ s}}\right)$$

Evaluate Formula 

## 13) Wave Runup above Mean Water Level for given Wave Transmission Coefficient Formula

Formula

$$R = \frac{F}{1 - \left(\frac{C_t}{C}\right)}$$

Example with Units

$$20 \text{ m} = \frac{5 \text{ m}}{1 - \left(\frac{0.2775}{0.37}\right)}$$

Evaluate Formula 

## 14) Wave Transmission Coefficient Formula

Formula

$$C_t = C \cdot \left(1 - \left(\frac{F}{R}\right)\right)$$

Example with Units

$$0.2775 = 0.37 \cdot \left(1 - \left(\frac{5 \text{ m}}{20 \text{ m}}\right)\right)$$




Evaluate Formula 



## Variables used in list of Wave Transmission Coefficient and Water Surface Amplitude Formulas above

- **B** Structure Crest Width (Meter)
- **C** Dimensionless Coefficient in the Seelig Equation
- **C<sub>t</sub>** Wave Transmission Coefficient
- **C<sub>t0</sub>** Coefficient of Transmission Flow over Structure
- **C<sub>tt</sub>** Coefficient of Wave Transmission through Structure
- **F** Freeboard (Meter)
- **h** Structure Crest Elevation (Meter)
- **H<sub>i</sub>** Incident Wave Height (Meter)
- **I<sub>r</sub>** Surf Similarity Number or Iribarren Number
- **L<sub>o</sub>** Incident Wave Length in Deepwater (Meter)
- **N** Water Surface Amplitude (Meter)
- **R** Wave Runup (Meter)
- **t** Time Elapsed (Second)
- **T** Reflected Wave Period (Second)
- **x** Horizontal Ordinate
- **α** Angle Sloped Plane forms with the Horizontal (Degree)

## Constants, Functions, Measurements used in list of Wave Transmission Coefficient and Water Surface Amplitude Formulas above

- **constant(s):** pi, 3.14159265358979323846264338327950288  
*Archimedes' constant*
- **Functions:** acos, acos(Number)  
*The inverse cosine function, is the inverse function of the cosine function. It is the function that takes a ratio as an input and returns the angle whose cosine is equal to that ratio.*
- **Functions:** cos, cos(Angle)  
*Cosine of an angle is the ratio of the side adjacent to the angle to the hypotenuse of the triangle.*
- **Functions:** 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.*
- **Functions:** tan, tan(Angle)  
*The tangent of an angle is a trigonometric ratio of the length of the side opposite an angle to the length of the side adjacent to an angle in a right triangle.*
- **Measurement:** Length in Meter (m)  
*Length Unit Conversion* 
- **Measurement:** Time in Second (s)  
*Time Unit Conversion* 
- **Measurement:** Angle in Degree (°)  
*Angle Unit Conversion* 



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