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Wave Transmission Coefficient and Water Surface Amplitude Formulas

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List of 14 Wave Transmission Coefficient and Water Surface Amplitude Formulas

Wave Transmission Coefficient and Water Surface Amplitude

1) Coefficient for Wave Transmission by Flow over Structure

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

Open Calculator 

$$ex \quad 0.150102 = \sqrt{(0.2775)^2 - (0.2334)^2}$$

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

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

Open Calculator 

$$ex \quad 0.233466 = \sqrt{(0.2775)^2 - (0.15)^2}$$

3) Combined Wave Transmission Coefficient

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

Open Calculator 

$$ex \quad 0.277445 = \sqrt{(0.2334)^2 + (0.15)^2}$$



4) Dimensionless Coefficient in Seelig Equation

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

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235_img.jpg\)](#)

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

5) Dimensionless Coefficient in Seelig Equation for Wave Transmission Coefficient

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

[Open Calculator !\[\]\(3e2231b1ad3ca8da8658228c00dd08e0_img.jpg\)](#)

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

6) Freeboard for given Wave Transmission Coefficient

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

[Open Calculator !\[\]\(0d5ec72f61334709c3fc9450209b754f_img.jpg\)](#)

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



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



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

Open Calculator

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

8) Incident Wave Height given Water Surface Amplitude

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

Open Calculator

$$ex \quad 157.2228m = \frac{78.78m}{\cos\left(\frac{2 \cdot \pi \cdot 38.5}{16m}\right) \cdot \cos\left(\frac{2 \cdot \pi \cdot 12s}{34s}\right)}$$

9) Reflected Wave Period given Water Surface Amplitude

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

Open Calculator

$$ex \quad 34.20117s = \frac{2 \cdot \pi \cdot 12s}{a \cos\left(\frac{78.78m}{160m \cdot \cos\left(\frac{2 \cdot \pi \cdot 38.5}{16m}\right)}\right)}$$



10) Surf Similarity Number or Iribarren Number 

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

Open Calculator 

$$ex \quad 0.095023 = \frac{\tan(16.725^\circ)}{\sqrt{\frac{160m}{16m}}}$$

11) Time Elapsed given Water Surface Amplitude 

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

Open Calculator 

$$ex \quad 11.92942s = 34s \cdot \frac{a \cos\left(\frac{78.78m}{160m \cdot \cos\left(\frac{2 \cdot \pi \cdot 38.5}{16m}\right)}\right)}{2 \cdot \pi}$$

12) Water Surface Amplitude 

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

Open Calculator 

$$ex \quad 80.17158m = 160m \cdot \cos\left(\frac{2 \cdot \pi \cdot 38.5}{16m}\right) \cdot \cos\left(\frac{2 \cdot \pi \cdot 12s}{34s}\right)$$



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

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

[Open Calculator !\[\]\(d3fb9f94af8b26d1c844efa9a98805b0_img.jpg\)](#)

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

14) Wave Transmission Coefficient

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

[Open Calculator !\[\]\(e1d6102fe77919492c04879c8450f1f5_img.jpg\)](#)

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






Variables Used

- **B** Structure Crest Width (*Meter*)
- **C** Dimensionless Coefficient in the Seelig Equation
- **C_t** Wave Transmission Coefficient
- **C_{t0}** Coefficient of Transmission Flow over Structure
- **C_{tt}** Coefficient of Wave Transmission through Structure
- **F** Freeboard (*Meter*)
- **h** Structure Crest Elevation (*Meter*)
- **H_i** Incident Wave Height (*Meter*)
- **I_r** Surf Similarity Number or Iribarren Number
- **L_o** 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

- **Constant:** **pi**, 3.14159265358979323846264338327950288
Archimedes' constant
- **Function:** **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.
- **Function:** **cos**, `cos(Angle)`
Cosine of an angle is the ratio of the side adjacent to the angle to the hypotenuse of the triangle.
- **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.
- **Function:** **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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- [Wave Transmission Coefficient and Water Surface Amplitude Formulas](#) 

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