Important Wavelength Formulas PDF



Formulas Examples with Units

List of 14

Important Wavelength Formulas

Evaluate Formula

Evaluate Formula

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Evaluate Formula (

Evaluate Formula [

Evaluate Formula 🕝

1) Deepwater Wavelength given Celerity of Deepwater Wave Formula 🕝



$$\lambda_{o} = \frac{C_{o}^{2} \cdot 2 \cdot \pi}{[g]}$$

$$\lambda_{o} = \frac{C_{o}^{2} \cdot 2 \cdot \pi}{[g]}$$
 12.9743 m = $\frac{4.5 \,\text{m/s}^{2} \cdot 2 \cdot 3.1416}{9.8066 \,\text{m/s}^{2}}$

2) Deepwater Wavelength given Deepwater Celerity Formula C



$$\lambda_{o} = \frac{\lambda \cdot C_{o}}{C}$$

Example with Units

$$\lambda_{\rm o} = \frac{\lambda \cdot C_{\rm o}}{C}$$
 $12.9986 \,\mathrm{m} = \frac{10.11 \,\mathrm{m} \cdot 4.5 \,\mathrm{m/s}}{3.5 \,\mathrm{m/s}}$

3) Deepwater Wavelength given Units of Feet Formula 🕝

$$\lambda_{\text{ft}} = 5.12 \cdot \text{T}^2$$

4) Deepwater Wavelength given Wave Celerity Formula C



$$\lambda_0 = C_0 \cdot T$$

Example with Units

$$\lambda_{0} = C_{0} \cdot T \qquad 13.5 \,\mathrm{m} = 4.5 \,\mathrm{m/s} \cdot 3 \,\mathrm{s}$$

5) Deepwater Wavelength when SI systems Units of meters is Considered Formula 🗂

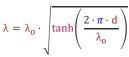


$$\lambda_0 = 1.56 \cdot T^2$$

Formula Example with Units
$$\lambda_{o} = 1.56 \cdot \text{T}^{2} \qquad 14.04 \, \text{m} = 1.56 \cdot 3 \, \text{s}^{2}$$

6) Eckert's Equation for Wavelength Formula





Example with Units

$$\lambda = \lambda_0 \cdot \left[\tanh \left(\frac{2 \cdot \pi \cdot d}{\lambda_0} \right) \right] \quad 10.3564 \,\mathrm{m} = 13 \,\mathrm{m} \cdot \sqrt{\tanh \left(\frac{2 \cdot 3.1416 \cdot 1.55 \,\mathrm{m}}{13 \,\mathrm{m}} \right)}$$

7) Long Wave Simplification for Wavelength Formula C

Example with Units

Evaluate Formula (

$$\lambda = T \cdot \sqrt{[g] \cdot d}$$

 $\lambda = T \cdot \sqrt{[g] \cdot d}$ 11.6963 m = 3s · $\sqrt{9.8066 \text{m/s}^2 \cdot 1.55 \text{ m}}$

8) Water Depth given Wave Celerity and Wavelength Formula [7]

Formula Example with Units
$$d = \frac{\lambda \cdot a tanh\left(\frac{2 \cdot \pi \cdot c}{|g| \cdot T}\right)}{2 \cdot \pi} \quad 1.5564_{m} = \frac{10.11_{m} \cdot a tanh\left(\frac{2 \cdot 3.1416 \cdot 3.5_{m/s}}{9.8066_{m/s^{2}} \cdot 3.s}\right)}{2 \cdot 3.1416}$$

Evaluate Formula C

9) Wavelength as Function of Depth and Wave Period Formula [7]

Formula

Example with Units

Evaluate Formula

$$\lambda = \left(\frac{[g] \cdot T^2}{2 \cdot \pi}\right) \cdot tanh\left(k \cdot d\right)$$

$$\lambda = \left(\frac{[\mathbf{g}] \cdot \mathbf{T}^2}{2 \cdot \pi}\right) \cdot \tanh\left(\mathbf{k} \cdot \mathbf{d}\right)$$

$$14.047_{\text{m}} = \left(\frac{9.8066_{\text{m/s}^2} \cdot 3_{\text{s}}^2}{2 \cdot 3.1416}\right) \cdot \tanh\left(5 \cdot 1.55_{\text{m}}\right)$$

10) Wavelength as Function of Water Depth and Wave Period Formula 🕝

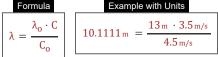
Formula

Evaluate Formula

$$\lambda = \left(\frac{[g] \cdot T}{\omega}\right) \cdot \tanh\left(k \cdot d\right)$$

$$\lambda = \left(\frac{[g] \cdot T}{\omega}\right) \cdot \tanh\left(k \cdot d\right) \qquad \boxed{11.768_m = \left(\frac{9.8066_m/s^2 \cdot 3_s}{2.5_{rad/s}}\right) \cdot \tanh\left(5 \cdot 1.55_m\right)}$$

11) Wavelength given Deepwater Celerity and Deepwater Wavelength Formula 🕝



Evaluate Formula

12) Wavelength given Deepwater Wavelength Formula C

Evaluate Formula (

$$\lambda = \lambda_0 \cdot \tanh(k \cdot d)$$

$$13_m = 13_m \cdot \tanh(5 \cdot 1.55_m)$$

13) Wavelength given Wave Celerity Formula C

Example with Units
$$10.5 \, \text{m} = 3.5 \, \text{m/s} \cdot 3 \, \text{s}$$

Evaluate Formula 🕝

Evaluate Formula 🕝

14) Wavelength given Wave Celerity and Wave Speed Formula C

Formula $\lambda = \frac{2 \cdot \pi \cdot d}{a \tanh\left(\frac{2 \cdot C \cdot \pi}{fol \cdot T}\right)}$

Example with Units
$$10.0687 \,\mathrm{m} = \frac{2 \cdot 3.1416 \cdot 1.55 \,\mathrm{m}}{a \tanh \left(\frac{2 \cdot 3.5 \,\mathrm{m/s} \cdot 3.1416}{9.8066 \,\mathrm{m/s}^2 \cdot 3 \,\mathrm{s}}\right)}$$

Variables used in list of Wavelength Formulas above

- C Wave Celerity (Meter per Second)
- Co Deepwater Wave Celerity (Meter per Second)
- d Water Depth (Meter)
- k Wave Number
- T Wave Period (Second)
- λ Wavelength (Meter)
- λ_{ft} DeepWater Wavelength in Feet (Foot)
- λ₀ DeepWater Wavelength (Meter)
- ω Wave Angular Frequency (Radian per Second)

Constants, Functions, Measurements used in list of Wavelength Formulas above

- constant(s): pi,
 3.14159265358979323846264338327950288
 Archimedes' constant
- constant(s): [g], 9.80665
 Gravitational acceleration on Earth
- Functions: atanh, atanh(Number)
 The inverse hyperbolic tangent function returns the value whose hyperbolic tangent is a number.
- 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: tanh, tanh(Number)
 The hyperbolic tangent function (tanh) is a function that is defined as the ratio of the hyperbolic sine function (sinh) to the hyperbolic cosine function (cosh).
- Measurement: Length in Meter (m), Foot (ft)

 Length Unit Conversion
- Measurement: Time in Second (s)

 Time Unit Conversion
- Measurement: Speed in Meter per Second (m/s)
 Speed Unit Conversion
- Measurement: Angular Frequency in Radian per Second (rad/s)

Angular Frequency Unit Conversion

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Simple fraction

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