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Wave Celerity Formulas

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List of 12 Wave Celerity Formulas

Wave Celerity

1) Celerity of Deepwater Wave

Open Calculator

fx $$C_o = \sqrt{\frac{[g] \cdot \lambda_o}{2 \cdot \pi}}$$

ex $$4.504453\text{m/s} = \sqrt{\frac{[g] \cdot 13\text{m}}{2 \cdot \pi}}$$

2) Celerity of Wave given Deepwater Celerity and Wavelength

Open Calculator

fx $$C_s = \frac{C_o \cdot \lambda_s}{\lambda_o}$$

ex $$2.769231\text{m/s} = \frac{4.5\text{m/s} \cdot 8\text{m}}{13\text{m}}$$

3) Deepwater Celerity for Deepwater wavelength

Open Calculator

fx $$C_o = \frac{C_s \cdot \lambda_o}{\lambda_s}$$

ex $$4.55\text{m/s} = \frac{2.8\text{m/s} \cdot 13\text{m}}{8\text{m}}$$

4) Deepwater Celerity given Units of Feet and Seconds

Open Calculator

fx $C_f = 5.12 \cdot T$

ex $50.3937\text{ft/s} = 5.12 \cdot 3\text{s}$

5) Deepwater Celerity given Wave Period

Open Calculator

fx $C_o = \frac{[g] \cdot T}{2 \cdot \pi}$

ex $4.68233\text{m/s} = \frac{[g] \cdot 3\text{s}}{2 \cdot \pi}$

6) Deepwater Celerity when SI systems Units of Meters and Seconds is considered

Open Calculator

fx $C_o = 1.56 \cdot T$

ex $4.68\text{m/s} = 1.56 \cdot 3\text{s}$

7) Deepwater Wave Celerity

Open Calculator

fx $C_o = \frac{\lambda_o}{T}$

ex $4.333333\text{m/s} = \frac{13\text{m}}{3\text{s}}$

8) Wave Celerity given Wave Period and Wavelength

Open Calculator

fx $$C_o = \left(\frac{[g] \cdot T}{2 \cdot \pi}\right) \cdot \tanh\left(\frac{2 \cdot \pi \cdot d}{\lambda_o}\right)$$

ex $$4.592745\text{m/s} = \left(\frac{[g] \cdot 3\text{s}}{2 \cdot \pi}\right) \cdot \tanh\left(\frac{2 \cdot \pi \cdot 4.8\text{m}}{13\text{m}}\right)$$

9) Wave Celerity given Wavelength and Water Depth

Open Calculator

fx $$C_o = \sqrt{\left(\frac{\lambda_o \cdot [g]}{2 \cdot \pi}\right) \cdot \tanh\left(\frac{2 \cdot \pi \cdot d}{\lambda_o}\right)}$$

ex $$4.461154\text{m/s} = \sqrt{\left(\frac{13\text{m} \cdot [g]}{2 \cdot \pi}\right) \cdot \tanh\left(\frac{2 \cdot \pi \cdot 4.8\text{m}}{13\text{m}}\right)}$$

10) Wave Celerity given Wavelength and Wave Period

Open Calculator

fx $$C_o = \frac{\lambda_o}{T}$$

ex $$4.333333\text{m/s} = \frac{13\text{m}}{3\text{s}}$$

11) Wave Celerity when Relative Water Depth becomes Shallow

Open Calculator

fx $$C_s = \sqrt{[g] \cdot d_s}$$

ex $$2.80095\text{m/s} = \sqrt{[g] \cdot 0.8\text{m}}$$

12) Wave Period given Deepwater Celerity

Open Calculator

fx $$T = \frac{\lambda_o}{C_o}$$

ex $$2.888889\text{s} = \frac{13\text{m}}{4.5\text{m/s}}$$

Variables Used

- C_f Celerity in FPS Unit *(Foot per Second)*
- C_o Deepwater Wave Celerity *(Meter per Second)*
- C_s Celerity for Shallow Depth *(Meter per Second)*
- d Water Depth *(Meter)*
- d_s Shallow Depth *(Meter)*
- T Wave Period *(Second)*
- λ_o DeepWater Wavelength *(Meter)*
- λ_s Wavelength for Shallow Depth *(Meter)*

Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Constant: **[g]**, 9.80665
  Gravitational acceleration on Earth
- 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: **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)
  Length Unit Conversion
- Measurement: **Time** in Second (s)
  Time Unit Conversion
- Measurement: **Speed** in Meter per Second (m/s), Foot per Second (ft/s)
  Speed Unit Conversion

Check other formula lists

- Cnoidal Wave Theory Formulas
- Horizontal and Vertical Semi-Axis of Ellipse Formulas
- Parametric Spectrum Models Formulas
- Wave Celerity Formulas
- Wave Energy Formulas
- Wave Parameters Formulas
- Wave Period Formulas
- Wave Period Distribution and Wave Spectrum Formulas
- Wavelength Formulas
- Zero-Crossing Method Formulas

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