



Wave Period Distribution and Wave Spectrum Formulas

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Examples!

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List of 10 Wave Period Distribution and Wave Spectrum Formulas

Wave Period Distribution and Wave Spectrum

1) Equilibrium Form of PM Spectrum for Fully-Developed Seas

fx Open Calculator

$$\mathrm{E_{f}} = \left(rac{0.0081\cdot\left[\mathrm{g}
ight]^{2}}{\left(2\cdot\pi
ight)^{4}\cdot\mathrm{f}^{5}}
ight)\cdot\exp\!\left(-0.24\cdot\left(rac{2\cdot\pi\cdot\mathrm{U}\cdot\mathrm{f}}{\left[\mathrm{g}
ight]}
ight)^{-4}
ight)$$

ex

$$\boxed{1.5\text{E}^-8 = \left(\frac{0.0081 \cdot \left[g\right]^2}{\left(2 \cdot \pi\right)^4 \cdot \left(8\text{kHz}\right)^5}\right) \cdot \exp\left(-0.24 \cdot \left(\frac{2 \cdot \pi \cdot 4\text{m/s} \cdot 8\text{kHz}}{\left[g\right]}\right)^{-4}\right)}$$

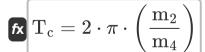
2) Maximum Wave Period 🔄

fx $T_{
m max} = \Delta \cdot T'$



 $85.8s = 33 \cdot 2.6s$

3) Mean Crest Period 🖸



ex
$$14.90925 s = 2 \cdot \pi \cdot \left(\frac{1.4}{0.59}\right)$$





4) Mean Zero-upcrossing Period

 $ag{T'}_{
m Z} = 2 \cdot \pi \cdot \sqrt{rac{{
m m}_0}{{
m m}_2}}$

Open Calculator 🗗

ex $86.44478 ext{s} = 2 \cdot \pi \cdot \sqrt{\frac{265}{1.4}}$

5) Most Probable Maximum Wave Period

 $ag{T}_{
m max} = 2 \cdot rac{\sqrt{1+{
m v}^2}}{1} + \sqrt{1+\left(16 \cdot rac{{
m v}^2}{\pi} \cdot {
m H}^2
ight)}$

Open Calculator

 $ext{ex} 87.80989 ext{s} = 2 \cdot rac{\sqrt{1 + (10)^2}}{1} + \sqrt{1 + \left(16 \cdot rac{(10)^2}{\pi} \cdot (3 ext{m})^2
ight)}$

6) Probability Density of Wave Period

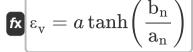
 $\left| \mathbf{p} = 2.7 \cdot \left(rac{\mathrm{P}^3}{\mathrm{T}'}
ight) \cdot \exp \left(-0.675 \cdot \left(rac{\mathrm{P}}{\mathrm{T}'}
ight)^4
ight)
ight|$

Open Calculator

 $\boxed{1.116046 = 2.7 \cdot \left(\frac{(1.03)^3}{2.6 \text{s}}\right) \cdot \exp\left(-0.675 \cdot \left(\frac{1.03}{2.6 \text{s}}\right)^4\right)}$



7) Relative Phase given coefficients



Open Calculator

8) Spectral Bandwidth

$$V = \sqrt{1-\left(rac{m_2^2}{m_0\cdot m_4}
ight)}$$

Open Calculator 🗗

ex
$$0.993712 \mathrm{m} = \sqrt{1 - \left(rac{(1.4)^2}{265 \cdot 0.59}
ight)}$$

9) Spectral Width

$$\mathbf{v} = \sqrt{\left(\mathbf{m}_0 \cdot rac{\mathbf{m}_2}{\mathbf{m}_1^2}
ight) - 1}$$

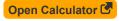
$$\mathbf{ex} = 9.578622 = \sqrt{\left(265 \cdot \frac{1.4}{\left(2\right)^2}\right) - 1}$$





10) Wave Component Amplitude





$$\mathbf{a} = \sqrt{0.5 \cdot \sqrt{a_{\mathrm{n}}^2 + b_{\mathrm{n}}^2}}$$

$$ext{ex} \left[0.551487 ext{m} = \sqrt{0.5 \cdot \sqrt{(0.6)^2 + (0.1)^2}}
ight]$$



Variables Used

- a Wave Amplitude (Meter)
- a_n Coefficient of Wave Component Amplitude
- bn Coefficient of Wave Component Amplitude bn
- Ef Frequency Energy Spectrum
- **f** Wave Frequency (Kilohertz)
- **H** Wave Height (Meter)
- m₀ Zero-th Moment of Wave Spectrum
- m₁ Moment of Wave Spectrum 1
- m₂ Moment of Wave Spectrum 2
- m₄ Moment of Wave Spectrum 4
- p Probability
- P Wave Period
- T' Mean Wave Period (Second)
- T_c Wave Crest Period (Second)
- T_{max} Maximum Wave Period (Second)
- T'_Z Mean Zero-upcrossing Period (Second)
- **U** Wind Speed (Meter per Second)
- V Spectral Width
- **V** Spectral Bandwidth (Meter)
- A Coefficient Eckman
- ε_ν Relative Phase





Constants, Functions, Measurements used

- Constant: pi, 3.14159265358979323846264338327950288
 Archimedes' constant
- Constant: [g], 9.80665

 Gravitational acceleration on Earth
- Function: atanh, atanh(Number)

 The inverse hyperbolic tangent function returns the value whose hyperbolic tangent is a number.
- Function: exp, exp(Number)
 n an exponential function, the value of the function changes by a constant factor for every unit change in the independent variable.
- 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)
 Speed Unit Conversion
- Measurement: Frequency in Kilohertz (kHz)
 Frequency Unit Conversion





Check other formula lists

- Cnoidal Wave Theory Formulas Wave Period Formulas •
- Horizontal and Vertical Semi-Axis of Ellipse Formulas
- Wave Parameters Formulas
- Wave Period Distribution and Wave Spectrum Formulas
- Zero-Crossing Method Formulas

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