

Important Zero-Crossing Method Formulas PDF



**Formulas
Examples
with Units**

List of 12 Important Zero-Crossing Method Formulas

1) Number of Crests in Wave Record given Wave Crest Period Formula

Formula

$$N_c = \frac{T_r}{T_c}$$

Example with Units

$$18.0412 = \frac{70s}{3.88s}$$

Evaluate Formula 

2) Number of Zero Up-Crossings given Zero-Crossing Period Formula

Formula

$$N_z = \frac{T_r}{T_z}$$

Example with Units

$$10 = \frac{70s}{7s}$$

Evaluate Formula 

3) Probability that Wave Height is Greater than or Equal to Design Wave Height Formula

Formula

$$p = \frac{m}{4}$$

Example with Units

$$0.5 = \frac{2}{41/m}$$

Evaluate Formula 

4) Probability that Wave Height is Lesser than or Equal to Design Wave Height Formula

Formula

$$p = 1 - \left(\frac{m}{4} \right)$$

Example with Units

$$0.5 = 1 - \left(\frac{2}{41/m} \right)$$

Evaluate Formula 

5) Record Length given Wave Crest Period Formula

Formula

$$T_r = T_c \cdot N_c$$

Example with Units

$$69.84s = 3.88s \cdot 18$$

Evaluate Formula 

6) Record Length given Zero-Crossing Period Formula

Formula

$$T_r = T_z \cdot N_z$$

Example with Units

$$70s = 7s \cdot 10$$

Evaluate Formula 



7) Root Mean Square Surface Elevation given Significant Wave Height Formula

Formula

$$\eta_{\text{rms}} = \frac{H_s}{4}$$

Example with Units

$$16.25 \text{ m} = \frac{65 \text{ m}}{4}$$

Evaluate Formula 

8) Significant Wave Height given rms Surface Elevation Formula

Formula

$$H_s = 4 \cdot \eta_{\text{rms}}$$

Example with Units

$$64 \text{ m} = 4 \cdot 16 \text{ m}$$

Evaluate Formula 

9) Significant Wave Height given Zero-th Moment Formula

Formula

$$H_s = 4 \cdot \sqrt{m_0}$$

Example with Units

$$65.1153 \text{ m} = 4 \cdot \sqrt{265}$$

Evaluate Formula 

10) Wave Crest Period Formula

Formula

$$T_c = \frac{T_r}{N_c}$$

Example with Units

$$3.8889 \text{ s} = \frac{70 \text{ s}}{18}$$

Evaluate Formula 

11) Zero-Crossing Period Formula

Formula

$$T_Z = \frac{T_r}{N_Z}$$

Example with Units

$$7 \text{ s} = \frac{70 \text{ s}}{10}$$

Evaluate Formula 

12) Zero-th Moment given Significant Wave Height Formula

Formula

$$m_0 = \left(\frac{H_s}{4} \right)^2$$

Example with Units

$$264.0625 = \left(\frac{65 \text{ m}}{4} \right)^2$$




Evaluate Formula 



Variables used in list of Zero-Crossing Method Formulas above



- **4** Wave Number (1 per Meter)
- **H_s** Significant Wave Height (Meter)
- **m** Number of Waves Higher than Design Wave Height
- **m₀** Zero-th Moment of Wave Spectrum
- **N_c** Number of Crests
- **N_Z** Number of Zero-Upcrossings
- **p** Probability
- **T_c** Wave Crest Period (Second)
- **T_r** Record Length (Second)
- **T_Z** Zero-Crossing Period (Second)
- **η_{rms}** RMS Surface Elevation (Meter)

Constants, Functions, Measurements used in list of Zero-Crossing Method Formulas above

- **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.
- **Measurement:** **Length** in Meter (m)
Length Unit Conversion 
- **Measurement:** **Time** in Second (s)
Time Unit Conversion 
- **Measurement:** **Wave Number** in 1 per Meter (1/m)
Wave Number Unit Conversion 



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