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Horizontal and Vertical Semi-Axis of Ellipse Formulas

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List of 13 Horizontal and Vertical Semi-Axis of Ellipse Formulas

Horizontal and Vertical Semi-Axis of Ellipse

1) Major Horizontal Semi Axis for Deep Water Condition

Open Calculator

fx $$A = \left(\frac{H_w}{2}\right) \cdot \exp\left(2 \cdot \pi \cdot \frac{Z}{L}\right)$$

ex $$7.402077 = \left(\frac{14\text{m}}{2}\right) \cdot \exp\left(2 \cdot \pi \cdot \frac{0.8}{90\text{m}}\right)$$

2) Major Horizontal Semi Axis for Shallow Water Condition

Open Calculator

fx $$A = \left(\frac{H_w}{2}\right) \cdot \left(\frac{L}{2 \cdot \pi \cdot d_s}\right)$$

ex $$7.427231 = \left(\frac{14\text{m}}{2}\right) \cdot \left(\frac{90\text{m}}{2 \cdot \pi \cdot 13.5\text{m}}\right)$$

3) Minor Vertical Semi Axis for Shallow Water Condition

Open Calculator

fx $$B = \left(\frac{H_w}{2}\right) \cdot \left(1 + \frac{Z}{d_s}\right)$$

ex $$7.414815 = \left(\frac{14\text{m}}{2}\right) \cdot \left(1 + \frac{0.8}{13.5\text{m}}\right)$$

4) Minor Vertical Semi-Axis for Deep Water Condition

Open Calculator

fx $$B = \left(\frac{H_w}{2}\right) \cdot \exp\left(2 \cdot \pi \cdot \frac{Z}{L}\right)$$

ex $$7.402077 = \left(\frac{14\text{m}}{2}\right) \cdot \exp\left(2 \cdot \pi \cdot \frac{0.8}{90\text{m}}\right)$$

5) Phase Angle for Horizontal Fluid Particle Displacement

fx

Open Calculator

$$\theta = asin\left(\left(\left(\left(\frac{\varepsilon}{a}\right) \cdot \left(\frac{\sinh\left(2 \cdot \pi \cdot \frac{d}{\lambda}\right)}{\cosh\left(2 \cdot \pi \cdot \frac{y}{\lambda}\right)}\right)\right)^2\right)^2\right)$$

ex $$0.000103^\circ = asin\left(\left(\left(\left(\frac{0.4\text{m}}{1.56\text{m}}\right) \cdot \left(\frac{\sinh\left(2 \cdot \pi \cdot \frac{1.05\text{m}}{26.8\text{m}}\right)}{\cosh\left(2 \cdot \pi \cdot \frac{4.92\text{m}}{26.8\text{m}}\right)}\right)\right)^2\right)^2\right)$$

6) Sea Bed Given Minor Vertical Semi-Axis for Shallow Water Condition

Open Calculator

fx $$Z = d_s \cdot \left(\left(\frac{B}{\frac{H_w}{2}}\right) - 1\right)$$

ex $$0.800357 = 13.5\text{m} \cdot \left(\left(\frac{7.415}{\frac{14\text{m}}{2}}\right) - 1\right)$$

7) Water Depth for Major Horizontal Semi-Axis for Shallow Water Condition

Open Calculator

fx $$d_s = \frac{H_w \cdot L}{4 \cdot \pi \cdot A}$$

ex $$13.54583\text{m} = \frac{14\text{m} \cdot 90\text{m}}{4 \cdot \pi \cdot 7.4021}$$

8) Water Depth Given Minor Vertical Semi-Axis for Shallow Water Condition

Open Calculator

fx $$d_s = \frac{Z}{\left(\frac{B}{\frac{H_w}{2}}\right) - 1}$$

ex $$13.49398\text{m} = \frac{0.8}{\left(\frac{7.415}{\frac{14\text{m}}{2}}\right) - 1}$$

9) Wave Height for Major Horizontal Semi-Axis Deep Water Condition

Open Calculator

fx $$H_w = \frac{2 \cdot A}{\exp\left(2 \cdot \pi \cdot \frac{Z}{L}\right)}$$

ex $$14.00004\text{m} = \frac{2 \cdot 7.4021}{\exp\left(2 \cdot \pi \cdot \frac{0.8}{90\text{m}}\right)}$$

10) Wave Height for Major Horizontal Semi-Axis for Shallow Water Condition

Open Calculator

fx $$H_w = \frac{4 \cdot A \cdot \pi \cdot d_s}{L}$$

ex $$13.95263\text{m} = \frac{4 \cdot 7.4021 \cdot \pi \cdot 13.5\text{m}}{90\text{m}}$$

11) Wave Height for Minor Vertical Semi-Axis Deep Water Condition

Open Calculator

fx $$H_w = \frac{2 \cdot B}{\exp\left(2 \cdot \pi \cdot \frac{Z}{L}\right)}$$

ex $$14.02444\text{m} = \frac{2 \cdot 7.415}{\exp\left(2 \cdot \pi \cdot \frac{0.8}{90\text{m}}\right)}$$

12) Wave Height Given Minor Vertical Semi-Axis for Shallow Water Condition

Open Calculator

fx $$H_w = \frac{2 \cdot B}{1 + \left(\frac{Z}{d_s}\right)}$$

ex $$14.00035\text{m} = \frac{2 \cdot 7.415}{1 + \left(\frac{0.8}{13.5\text{m}}\right)}$$

13) Wavelength for Major Horizontal Semi-Axis for Shallow Water Condition

Open Calculator

fx $$L = \frac{4 \cdot \pi \cdot d_s \cdot A}{H_w}$$

ex $$89.69548\text{m} = \frac{4 \cdot \pi \cdot 13.5\text{m} \cdot 7.4021}{14\text{m}}$$

Variables Used

- **a** Wave Amplitude *(Meter)*
- **A** Horizontal Semi-axis of Water Particle
- **B** Vertical Semi-Axis
- **d** Water Depth *(Meter)*
- d_s Water Depth for Semi-Axis of Ellipse *(Meter)*
- H_w Height of The Wave *(Meter)*
- **L** Length of Water Wave *(Meter)*
- **y** Elevation above the Bottom *(Meter)*
- **Z** Sea Bed Elevation
- **ε** Fluid Particle Displacement *(Meter)*
- **θ** Phase Angle *(Degree)*
- **λ** Wavelength of Coast *(Meter)*

Constants, Functions, Measurements used

- Constant: **pi**, 3.14159265358979323846264338327950288
  Archimedes' constant
- Function: **asin**, asin(Number)
  The inverse sine function, is a trigonometric function that takes a ratio of two sides of a right triangle and outputs the angle opposite the side with the given ratio.
- Function: **cosh**, cosh(Number)
  The hyperbolic cosine function is a mathematical function that is defined as the ratio of the sum of the exponential functions of x and negative x to 2.
- 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: **sin**, sin(Angle)
  Sine is a trigonometric function that describes the ratio of the length of the opposite side of a right triangle to the length of the hypotenuse.
- Function: **sinh**, sinh(Number)
  The hyperbolic sine function, also known as the sinh function, is a mathematical function that is defined as the hyperbolic analogue of the sine function.
- Measurement: **Length** in Meter (m)
  Length Unit Conversion
- Measurement: **Angle** in Degree (°)
  Angle Unit Conversion

Check other formula lists

- **Cnoidal Wave Theory Formulas**
- **Horizontal and Vertical Semi-Axis of Ellipse Formulas**
- **Wave Parameters Formulas**
- **Zero-Crossing Method Formulas**

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