Important Taylor's Stability Number and Stability Curves Formulas PDF

Formulas
Examples
with Units

List of 18
Important Taylor's Stability Number and Stability Curves Formulas

1) Angle of Internal Friction given Factor of Safety Formula

Evaluate Formula

Formula

$$\varphi = atan\left(\frac{f_s \cdot \gamma_{sat} \cdot \tan\left(\left(\varphi_{IF}\right)\right)}{\gamma'}\right)$$

Example with Units

$$9.9384° = atan\left(\frac{2.8 \cdot 9.98\,\text{N/m}^3 \cdot \tan\left(\left(11°\right)\right)}{31\,\text{N/m}^3}\right)$$

2) Angle of Internal Friction given Weighted Friction Angle Formula

Evaluate Formula

Formula

$$\varphi_{iw} = \frac{\varphi_w \cdot \gamma_{sat}}{\gamma'}$$

Example with Units

$$41.8516° = \frac{130° \cdot 9.98\,\text{N/m}^3}{31\,\text{N/m}^3}$$

3) Effective Angle of Internal Friction given Weighted Friction Angle Formula

Evaluate Formula

Formula

$$\varphi' = \frac{\varphi_{IF}}{\frac{\gamma'}{f_s \cdot \gamma_{sat}}}$$

Example with Units

$$9.9156° = \frac{11°}{\frac{31\,\text{N/m}^3}{2.8 \cdot 9.98\,\text{N/m}^3}}$$

4) Factor of Safety with respect to Shear Strength Formula

Evaluate Formula

Formula

$$f_s = \left(\left(\frac{\gamma'}{\gamma_{sat}}\right) \cdot \left(\frac{\tan\left(\left(\varphi\right)\right)}{\tan\left(\left(\varphi_{IF}\right)\right)}\right)\right)$$

Example with Units

$$2.7976 = \left(\left(\frac{31\,\text{N/m}^3}{9.98\,\text{N/m}^3}\right) \cdot \left(\frac{\tan\left(\left(9.93°\right)\right)}{\tan\left(\left(11°\right)\right)}\right)\right)$$

5) Factor of Safety with respect to Shear Strength given Weighted Friction Angle Formula

Evaluate Formula

Formula

$$f_s = \frac{\gamma' \cdot \varphi'}{\varphi_{IF} \cdot \gamma_{sat}}$$

Example with Units

$$2.821 = \frac{31\,\text{N/m}^3 \cdot 9.99°}{11° \cdot 9.98\,\text{N/m}^3}$$

6) Mobilized Friction Angle given Weighted Friction Angle Formula

Evaluate Formula

Formula

$$\varphi_m = \frac{\gamma_{sat} \cdot \varphi_w}{\gamma'}$$

Example with Units

$$41.8516° = \frac{9.98\,\text{N/m}^3 \cdot 130°}{31\,\text{N/m}^3}$$

7) Saturated Unit Weight given Factor of Safety with respect to Shear Strength Formula

Evaluate Formula

Formula

$$\gamma_{sat} = \left(\left(\frac{\gamma'}{\tan\left(\left(\varphi_{IF}\right)\right)}\right) \cdot \left(\frac{\tan\left(\left(\varphi\right)\right)}{f_s}\right)\right)$$

Example with Units

$$9.9714\,\text{N/m}^3 = \left(\left(\frac{31\,\text{N/m}^3}{\tan\left(\left(11°\right)\right)}\right) \cdot \left(\frac{\tan\left(\left(9.93°\right)\right)}{2.8}\right)\right)$$

8) Saturated Unit Weight given Weighted and Effective Friction Angle Formula

Evaluate Formula

Formula

$$\gamma_{sat} = \frac{\gamma' \cdot \varphi'}{\varphi_{IF} \cdot f_s}$$

Example with Units

$$10.0549\,\text{N/m}^3 = \frac{31\,\text{N/m}^3 \cdot 9.99°}{11° \cdot 2.8}$$

9) Saturated Unit Weight given Weighted and Mobilized Friction Angle Formula

Evaluate Formula

Formula

$$\gamma_{sat} = \frac{\gamma' \cdot \varphi_m}{\varphi_w}$$

Example with Units

$$9.5385\,\text{N/m}^3 = \frac{31\,\text{N/m}^3 \cdot 40°}{130°}$$

10) Saturated Unit Weight given Weighted Friction Angle Formula

Evaluate Formula

Formula

$$\gamma_{sat} = \frac{\gamma' \cdot \varphi_{iw}}{\varphi_w}$$

Example with Units

$$9.9796\,\text{N/m}^3 = \frac{31\,\text{N/m}^3 \cdot 41.85°}{130°}$$

11) Submerged Unit Weight given Factor of Safety with respect to Shear Strength Formula

Evaluate Formula

Formula

$$\gamma' = \frac{\tan\left(\frac{\varphi_w \cdot \pi}{180}\right)}{\left(\frac{1}{\gamma_{sat}}\right) \cdot \left(\frac{\tan\left(\frac{\Phi_i \cdot \pi}{180}\right)}{f_s}\right)}$$

Example with Units

$$43.85\,\text{N/m}^3 = \frac{\tan\left(\frac{130° \cdot 3.1416}{180}\right)}{\left(\frac{1}{9.98\,\text{N/m}^3}\right) \cdot \left(\frac{\tan\left(\frac{82.87° \cdot 3.1416}{180}\right)}{2.8}\right)}$$

12) Submerged Unit Weight given Weighted and Effective Friction Angle Formula

Evaluate Formula

Formula

$$\gamma' = \frac{\varphi_{IF} \cdot \left(\frac{180}{\pi}\right)}{\frac{\varphi' \cdot \left(\frac{180}{\pi}\right)}{f_s \cdot \gamma_{sat}}}$$

Example with Units

$$30.7692\,\text{N/m}^3 = \frac{11° \cdot \left(\frac{180}{3.1416}\right)}{\frac{9.99° \cdot \left(\frac{180}{3.1416}\right)}{2.8 \cdot 9.98\,\text{N/m}^3}}$$

13) Submerged Unit Weight given Weighted and Mobilised Friction Angle Formula

Evaluate Formula

Formula

$$\gamma' = \frac{\gamma_{sat} \cdot \varphi_w}{\varphi_m}$$

Example with Units

$$32.435\,\text{N/m}^3 = \frac{9.98\,\text{N/m}^3 \cdot 130°}{40°}$$

14) Submerged Unit Weight given Weighted Friction Angle Formula

Evaluate Formula

Formula

$$\gamma' = \frac{\varphi_w \cdot \gamma_{sat}}{\varphi_{iw}}$$

Example with Units

$$31.0012\,\text{N/m}^3 = \frac{130° \cdot 9.98\,\text{N/m}^3}{41.85°}$$

15) Weighted Friction Angle given Effective Angle of Internal Friction Formula

Evaluate Formula

Formula

$$\varphi_{IF} = \frac{\gamma' \cdot \varphi'}{f_s \cdot \gamma_{sat}}$$

Example with Units

$$11.0825° = \frac{31\,\text{N/m}^3 \cdot 9.99°}{2.8 \cdot 9.98\,\text{N/m}^3}$$

16) Weighted Friction Angle given Factor of Safety with respect to Shear Strength Formula

Evaluate Formula

Formula

$$\varphi_w = a\tan\left(\left(\frac{\gamma'}{\gamma_{sat}}\right) \cdot \left(\frac{\tan\left(\left(\Phi_i\right)\right)}{f_s}\right)\right)$$

Example with Units

$$83.5667° = a\tan\left(\left(\frac{31\,\text{N/m}^3}{9.98\,\text{N/m}^3}\right) \cdot \left(\frac{\tan\left(\left(82.87°\right)\right)}{2.8}\right)\right)$$

17) Weighted Friction Angle given Mobilised Friction Angle Formula

Evaluate Formula

Formula

$$\varphi_w = \frac{\gamma' \cdot \varphi_m}{\gamma_{sat}}$$

Example with Units

$$124.2485° = \frac{31\,\text{N/m}^3 \cdot 40°}{9.98\,\text{N/m}^3}$$

18) Weighted Friction Angle given Submerged Unit Weight Formula

Evaluate Formula

Formula

$$\varphi_w = \frac{\gamma' \cdot \varphi_{iw}}{\gamma_{sat}}$$

Example with Units

$$129.995° = \frac{31\,\text{N/m}^3 \cdot 41.85°}{9.98\,\text{N/m}^3}$$

Variables used in list of Taylor's Stability Number and Stability Curves Formulas above

- f_s Factor of Safety
- γ_{sat} Saturated Unit Weight *(Newton per Cubic Meter)*
- γ' Submerged Unit Weight *(Newton per Cubic Meter)*
- φ Angle of Internal Friction *(Degree)*
- φ' Effective Angle of Internal Friction *(Degree)*
- Φ_i Angle of Internal Friction of Soil *(Degree)*
- φ_{IF} Weighted Friction Angle for Internal Friction *(Degree)*
- φ_{iw} Internal Friction Angle with Weighted Frict. Angle *(Degree)*
- φ_m Angle of Mobilized Friction *(Degree)*
- φ_w Weighted Friction Angle *(Degree)*

Constants, Functions, Measurements used in list of Taylor's Stability Number and Stability Curves Formulas above

- constant(s): **pi**, 3.14159265358979323846264338327950288 *Archimedes' constant*
- Functions: **atan**, atan(Number) *Inverse tan is used to calculate the angle by applying the tangent ratio of the angle, which is the opposite side divided by the adjacent side of the right triangle.*
- Functions: **tan**, tan(Angle) *The tangent of an angle is a trigonometric ratio of the length of the side opposite an angle to the length of the side adjacent to an angle in a right triangle.*
- Measurement: **Angle** in Degree (°) *Angle Unit Conversion*
- Measurement: **Specific Weight** in Newton per Cubic Meter (N/m³) *Specific Weight Unit Conversion*

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