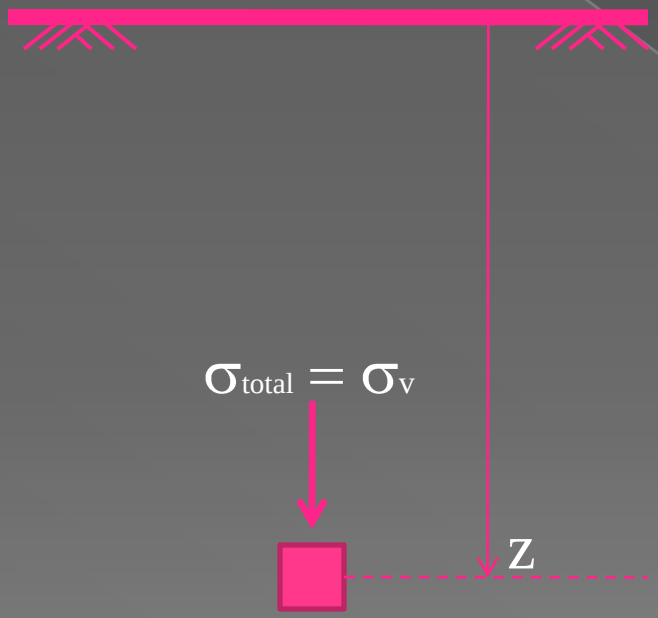
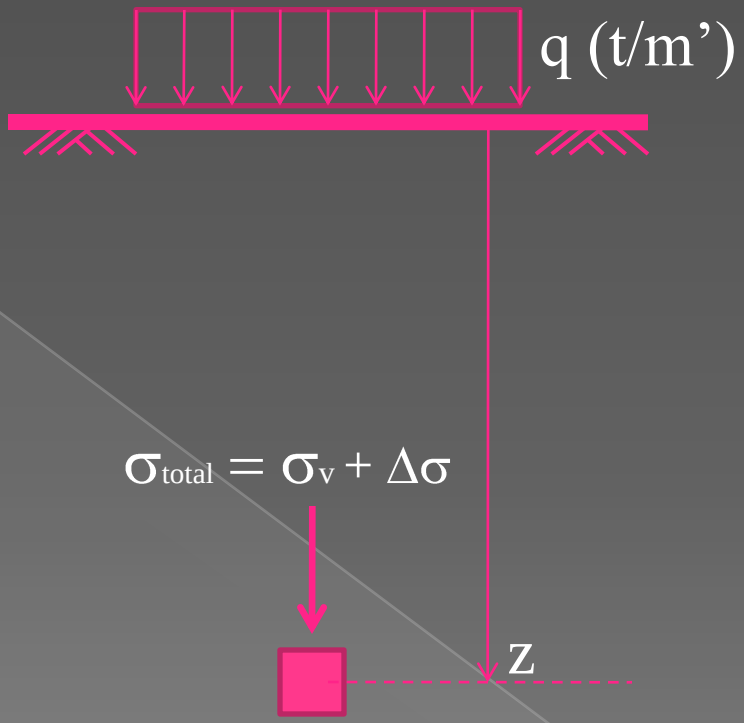
TEGANGAN PADA TANAH DAN DISTRIBUSI TEGANGAN

TEGANGAN TANAH

- Tujuan akhir : Untuk menghitung penurunan

EFEK BEBAN KE TANAH





METODE PERHITUNGAN

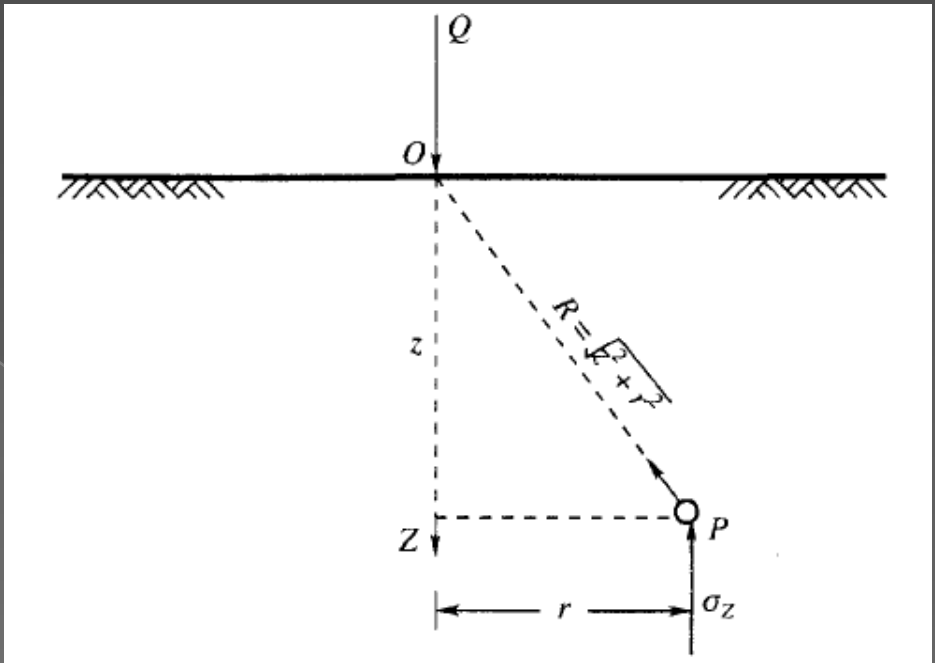
Metode menghitung distribusi tegangan :

- Boussinesq
- Westergaard
- Sederhana
- 2 : 1

BEBAN TERPUSAT

BEBAN TERPUSAT / BEBAN TITIK

- BOUSSINESQ



$$\sigma_z = \frac{3Q}{2\pi z^2} \frac{1}{[1+(r/z)^2]^{5/2}} = \frac{Q}{z^2} I_B \qquad (6.1)$$

where, r = the horizontal distance between an arbitrary point P below the surface and the vertical axis through the point load Q.

z = the vertical depth of the point P from the surface.

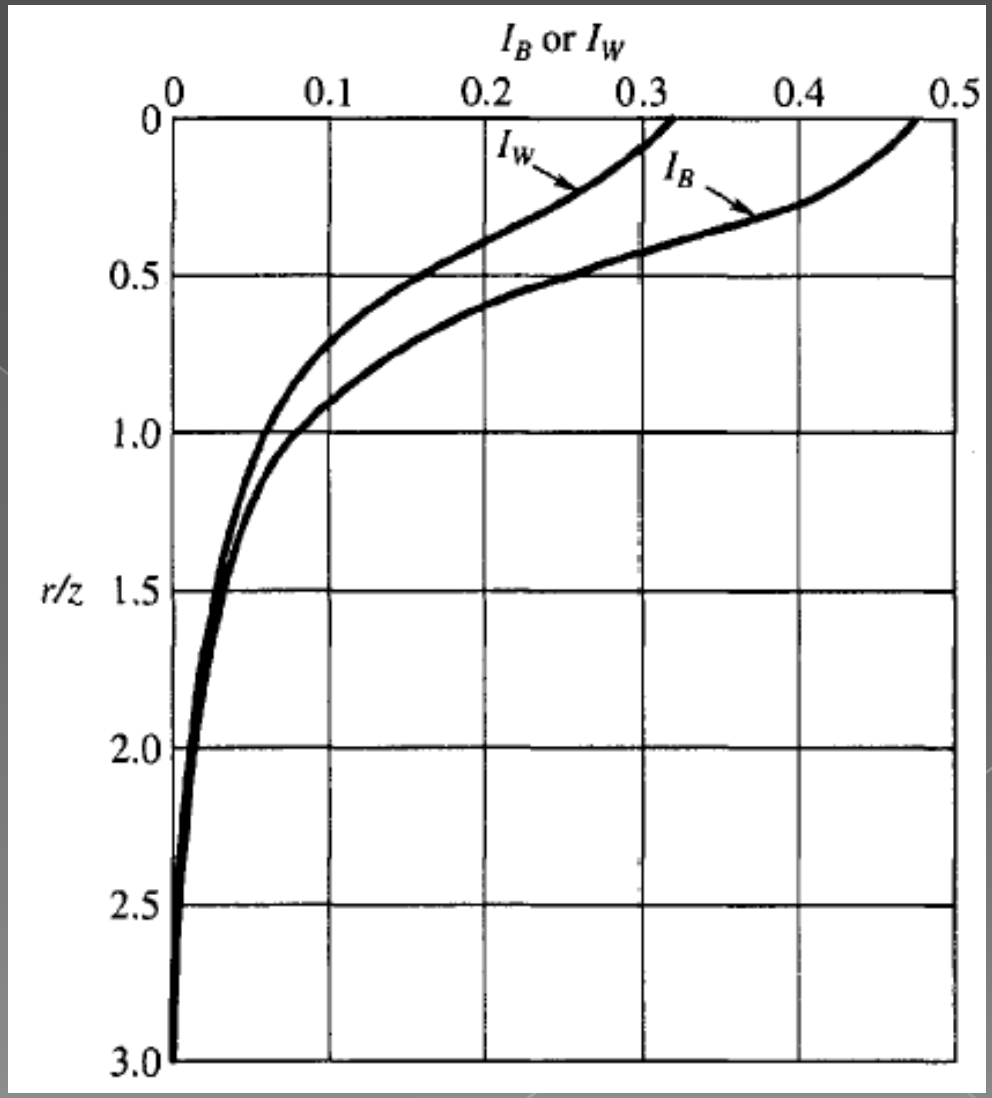
$$I_B = \text{Boussinesq stress coefficient} = \frac{3}{2\pi} \frac{1}{[1+(r/z)^2]^{5/2}} \qquad (6.1a)$$

BEBAN TERPUSAT / BEBAN TITIK

- WESTERGAARD

$$\sigma_z = \frac{Q}{\pi z^2} \frac{1}{[1+2(r/z)^2]^{3/2}} = \frac{Q}{z^2} I_w$$

$$I_w = \frac{(1/\pi)}{[1+2(r/z)^2]^{3/2}}$$



BEBAN TERPUSAT / BEBAN TITIK

- CONTOH

A concentrated load of 1000 kN is applied at the ground surface. Compute the vertical pressure (i) at a depth of 4 m below the load, (ii) at a distance of 3 m at the same depth. Use Boussinesq's equation.

Solution

The equation is

$$\sigma_z = \frac{Q}{z^2} I_B, \text{ where } I_B = \frac{3/2\pi}{\left[1+(r/z)^2\right]^{5/2}}$$

(i) When $r/z = 0$, $I_B = 3/2\ \pi = 0.48$, $\sigma_z = 0.48\frac{Q}{z^2} = 0.48 \times \frac{1000}{4 \times 4} = 30\ \text{kN/m}^2$

(ii) When $r/z = 3/4 = 0.75$

$$I_B = \frac{3/2\pi}{\left[1+(0.75)^2\right]^{5/2}} = 0.156,\ \sigma_z = \frac{0.156 \times 1000}{4 \times 4} = 9.8\ \text{kN/m}^2$$

BEBAN GARIS

BEBAN GARIS/LINE LOAD

- BOUSSINESQ

$$\sigma_z = \frac{q}{z}\,\frac{2/\pi}{[1+(x/z)^2]^2} = \frac{q}{z} I_z$$