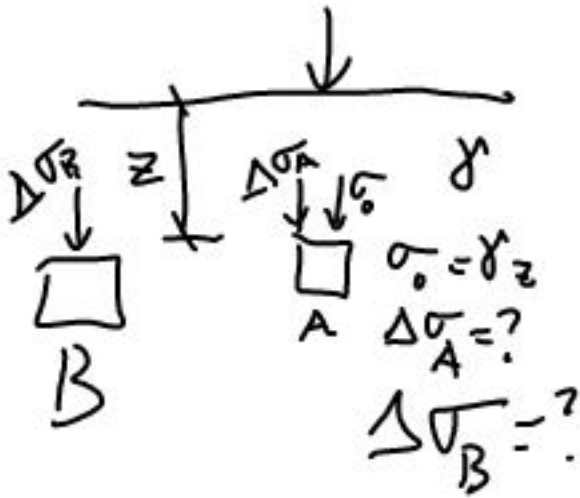


Erdal Cokca

Stresses Caused by a Point Load



Stress Caused by a Line Load

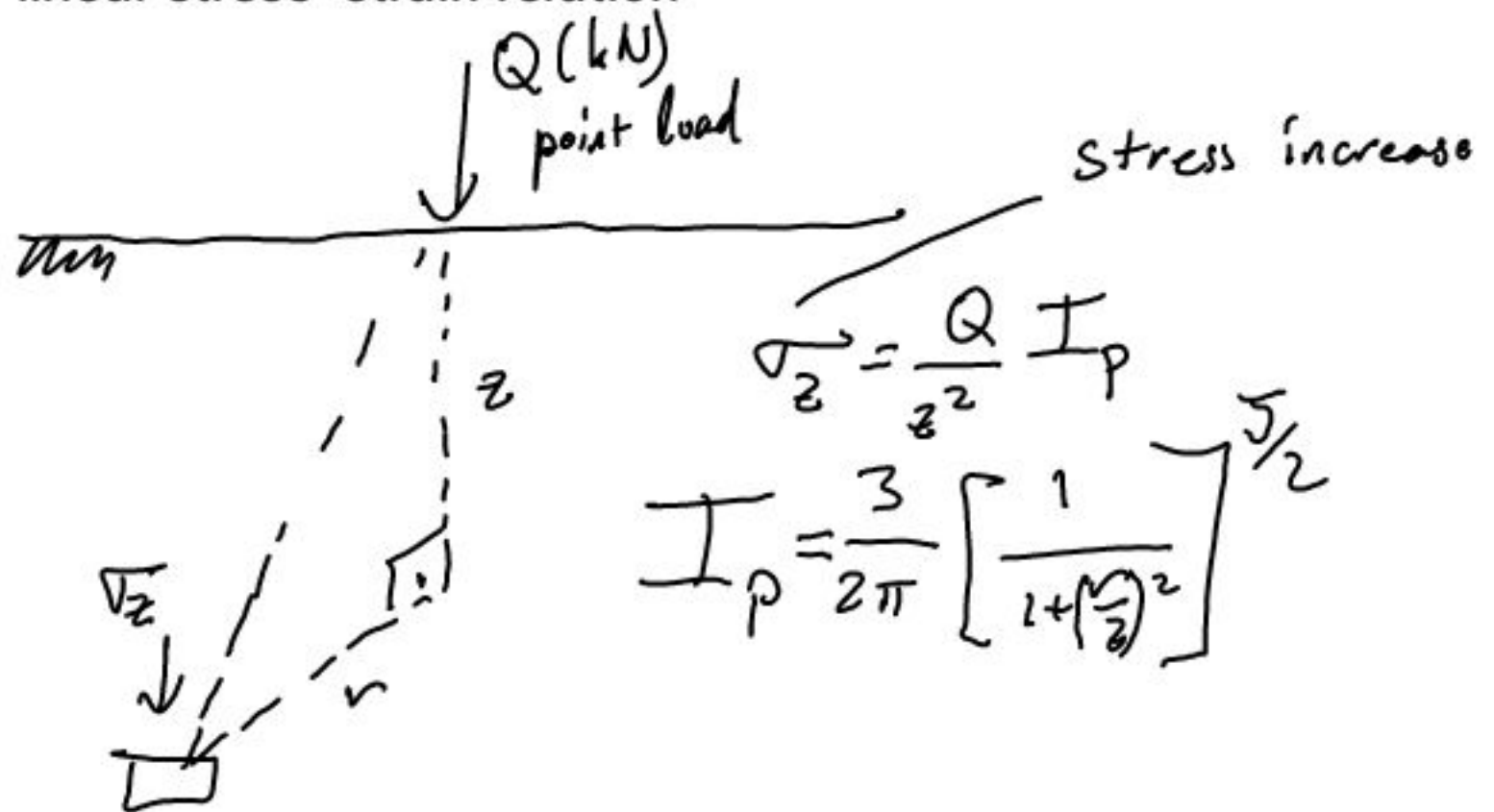
# Distribution of Vertical Stresses Beneath Different Types of Loading

## Elastic Theory

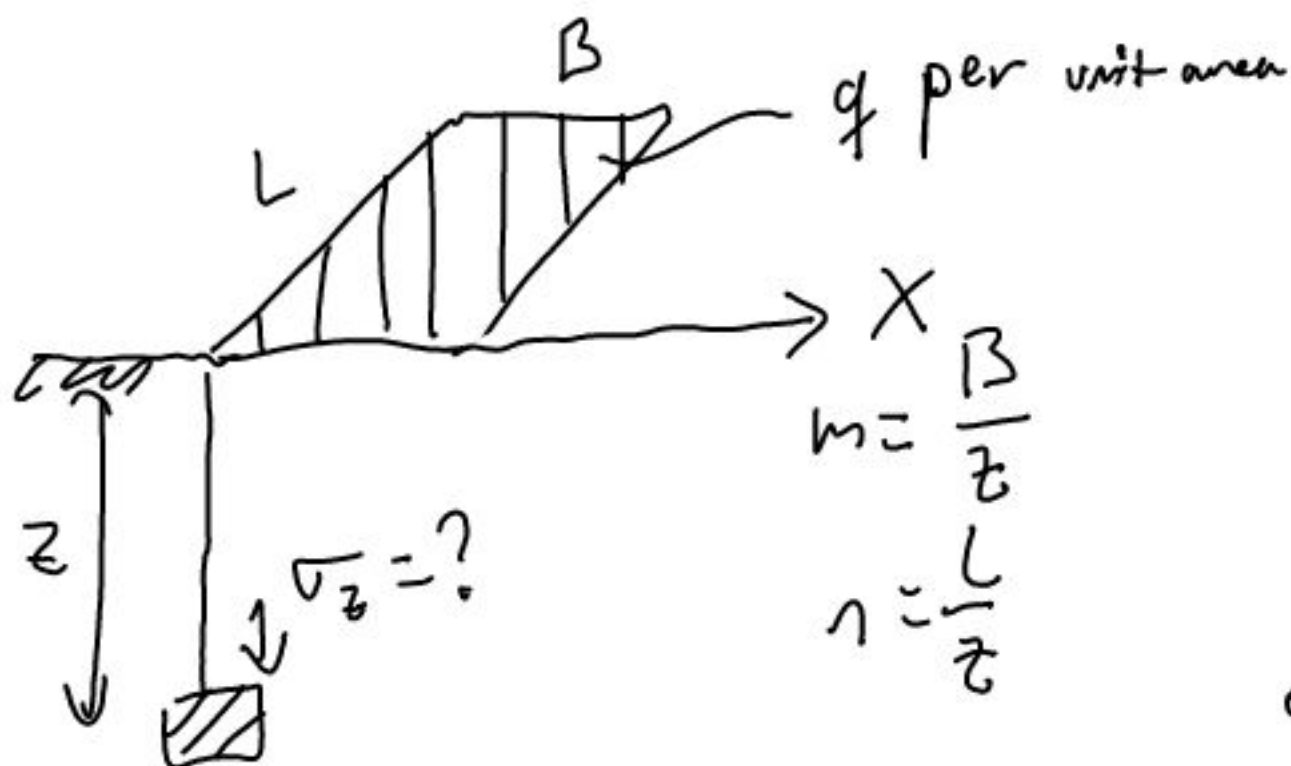
### Boussinesq 1885

#### Assumptions

- semi-infinite soil
- homogeneous soil
- Soil has linear stress-strain relation



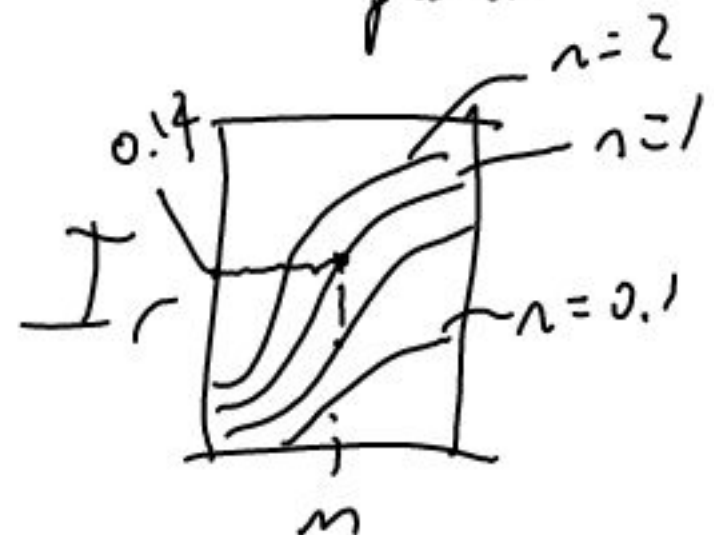
#### Uniformly Loaded Rectangular Area



vertical stress increase  $\sigma_z$  beneath one corner

$$\sigma_z = q I_r$$

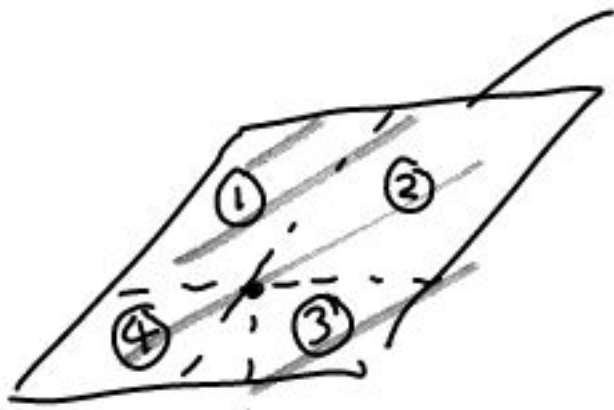
$I_r = I_r$  influence factor



Beneath any point

$q$

$$\sigma_z = q [I_{r_1} + I_{r_2} + I_{r_3} + I_{r_4}]$$

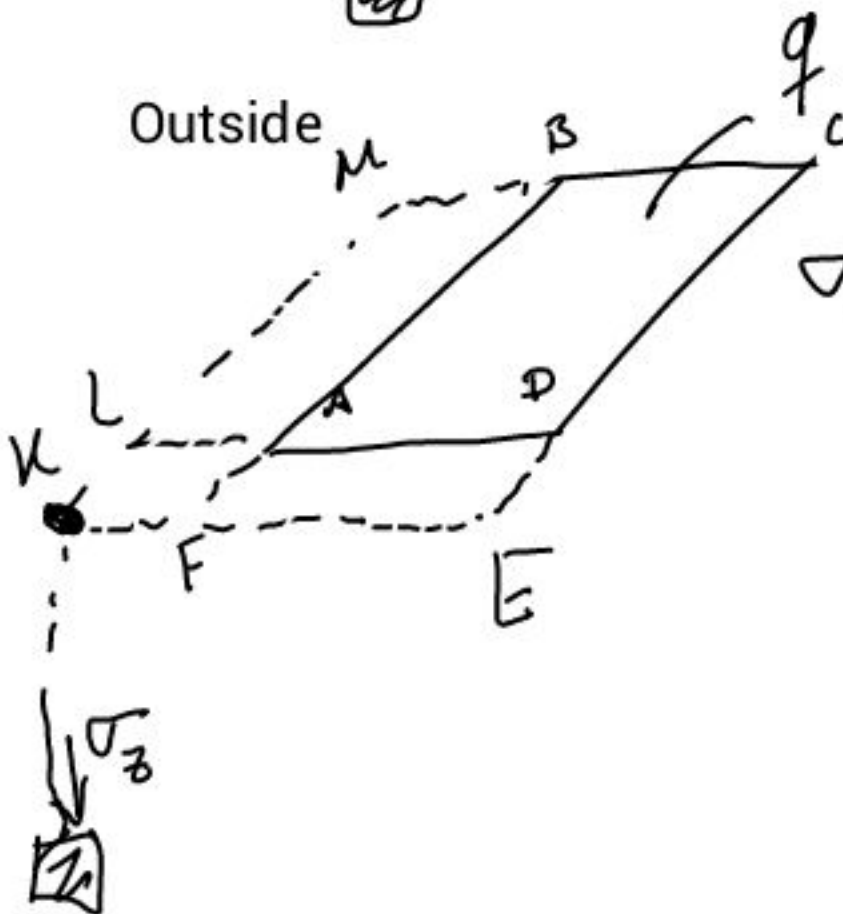


$\sigma_z = ?$

Outside

$q$

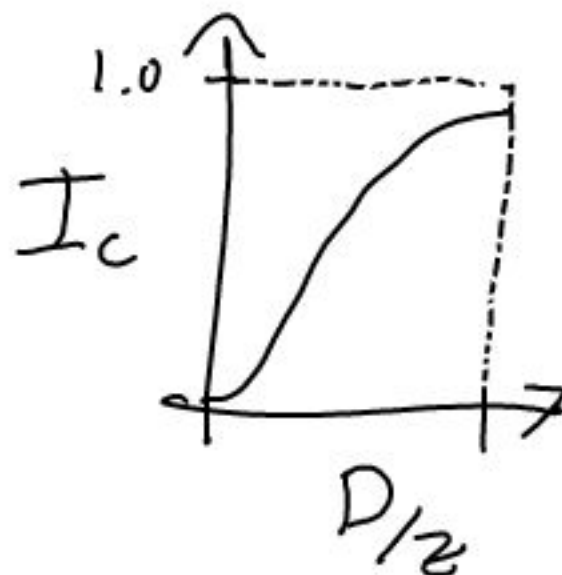
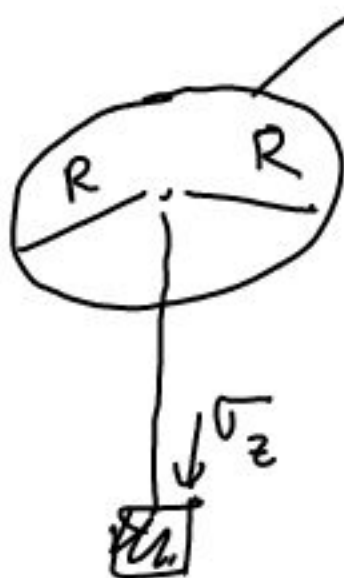
$$\sigma_z = q [I_{r_{KECM}} - I_{r_{KFBM}} - I_{r_{KLEF}} + I_{r_{KLAB}}]$$



Circular Area

$$\sigma_z = q I_c = q \left[ 1 - \frac{1}{1 + \left( \frac{R}{z} \right)^2} \right]^{3/2}$$

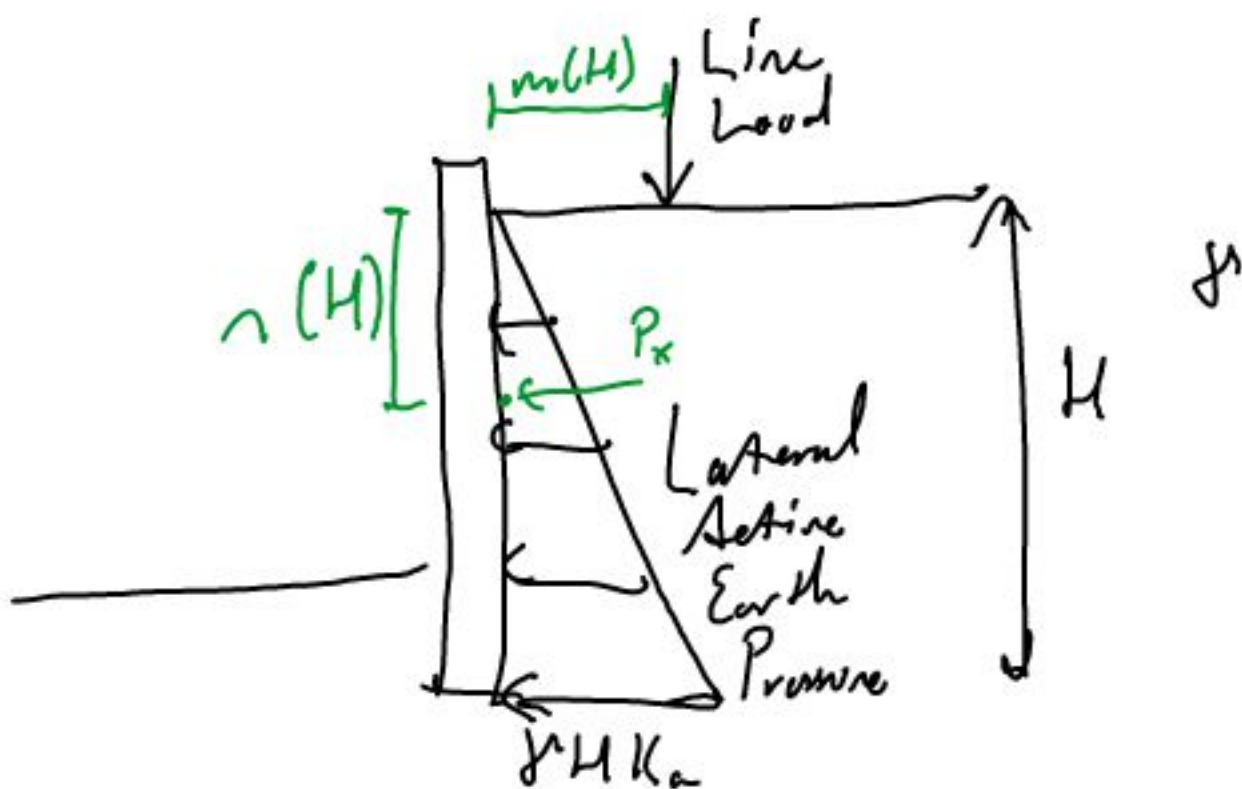
$$D = 2R$$



$$\sigma_z = q \cdot I$$

Highway Embankment

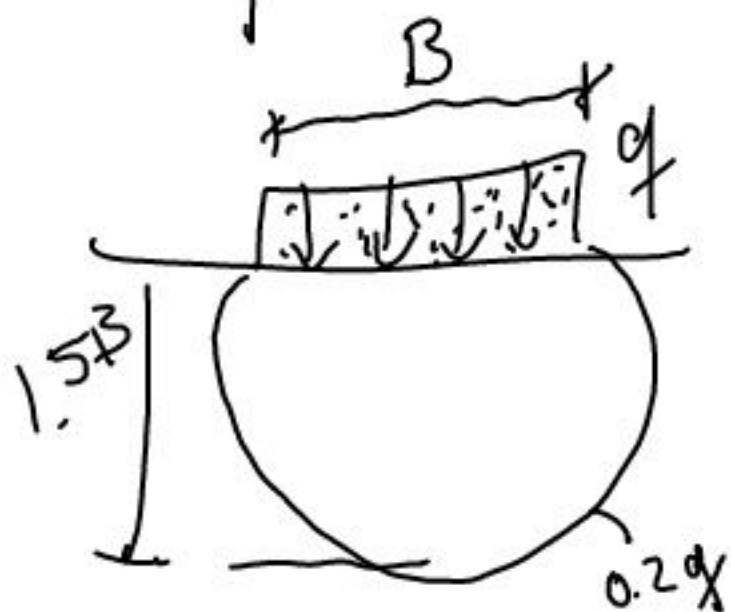




$$P_x = \frac{4Q}{\pi H} \frac{m^2 n}{(m^2 + n^2)^2}$$

## Bulb of Pressure

Square footing



Strip footing

