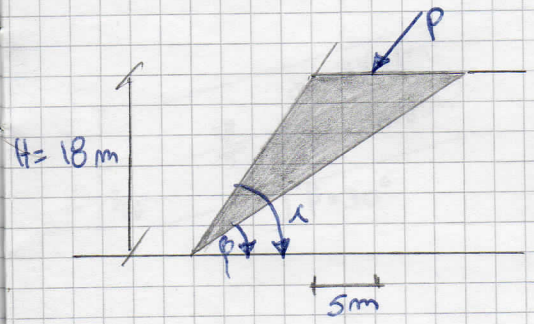
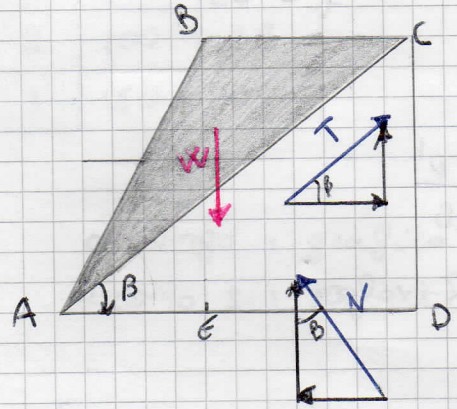
22/GIUGNO/2006

Determinare il coefficiente di sicurezza per il blocco rappresentato in figura nelle seguenti ipotesi d'inclinazione del carico superficiale P
$\alpha = 10°$ $\alpha = 0°$ $\alpha = -10°$ - Confrontare tali risultati con quello ottenuto in assenza di carichi e trarre le conclusioni. Pondere eventuali dati mancanti



$P = 800\ t/m$ $\beta = 23°$ $i = 45°$



$AD = CD \cdot tg\,\beta \Rightarrow H \cot g\,\beta$

$AD = 18 \cdot \cot 23 = 42,41$

$AE = H \cot i \Rightarrow 18 \cdot \cot 45°$

$BC = AD - AG = 24,41$

$A_{ABCD} = \frac{AD + BC}{2} \cdot CD = \frac{(42,41 + 24,41)}{2} \cdot 18 = 604,69$

$A_{ADC} = \frac{CD \cdot AD}{2} = 384,69$

$A_{ABC} = A_{ABCD} - A_{ADC} = 604,69 - 384,69 = 220$

assumo $\gamma = 2\ t/m$

$W = \gamma \cdot A_{ABC} = 2 \cdot 220 = 440\ t/m^3$

$$\begin{cases} \sum \vec{F}_{H=0} \\ \sum F_{V=0} \end{cases} \begin{cases} T\cos\beta - N\,sen\beta - P\,sen\alpha = 0 \\ W - T\,sin\beta - N\cos\beta + P\cos\alpha = 0 \end{cases} \begin{cases} N = \dfrac{T\cos\beta - P\,sen\alpha}{sin\beta} \\ \Rightarrow \end{cases}$$

$$\Rightarrow W - T\,sen\,\beta - \frac{T\cos\beta - P\,sen\alpha}{sin\beta} \cdot \cos\beta + P\cos\alpha = 0$$

$$\Rightarrow W - T\,sen\,\beta - \frac{T\cos^2\beta}{sin\beta} + \frac{P\,sen\,\alpha}{sin\beta} \cdot \cos\beta + \cos\alpha = 0$$

$$\Rightarrow W - T\left(\frac{sin^2\beta + \cos^2\beta}{sin\beta}\right) + \frac{P\,sen\,\alpha}{tg\,\beta} + P\cos\alpha = 0$$

$$\Rightarrow W - \frac{T}{sin\beta} + \frac{P\,sen\,\alpha}{tg\,\beta} + P\cos\alpha = 0$$

sostituisco $tg\beta$ con $\frac{\cos\beta}{sen\beta}$

$$T = \left[P\left(\frac{sin\alpha}{tg\beta} + \cos\alpha\right) + W\right] sin\beta$$

$$\begin{cases} T = (P\cos\alpha + W)\,sin\beta + P\,sin\alpha\cos\beta \\ N = (W + P\cos\alpha)\cos\beta - P\,sen\alpha\,sin\beta \end{cases}$$

$$F_S = \frac{N \operatorname{tg}\varphi'}{T} = \frac{[(W + P\cos\alpha)\cos\beta - P\sin\alpha\,\sin\beta]}{[(W + P\cos\alpha)\sin\beta + P\sin\alpha\cos\beta]} \operatorname{tg}\varphi' = D$$

caso senza carico applicato

$$F_S = \frac{t_0 \ell}{\operatorname{tg}\beta} \quad \text{impongo } F_S = 1 \qquad \varphi' = 23°$$

caso $\alpha = 0$

$$F_S = \frac{W + P\cos\beta \operatorname{tg}\varphi'}{W + P\sin\beta} = \frac{\operatorname{tg}\varphi'}{\operatorname{tg}\beta}$$

~~risp~~ non combia il valore

caso $\alpha = 10°$

$$F_S = \frac{[(439{,}38 + 800\cos 10)\cos 23 - 800\sin 10\,\sin 23°]}{[(439{,}38 + 800\cos 10°)\sin 23° + 800\sin 10\cos 23]} \quad \operatorname{tg}23° = 0{,}75$$

il valore è minore di 1 è diminuito

caso $\alpha = 10°$

$F_S = 1{,}43$ è aumentato