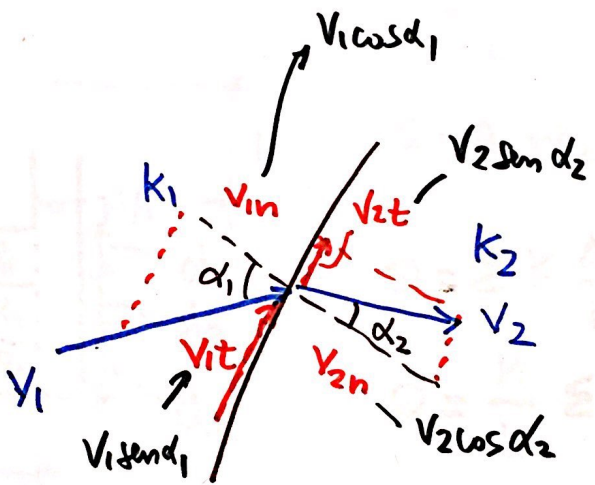


TRANSIÇÃO DE MEIOS - AULA 24/09/2020

①



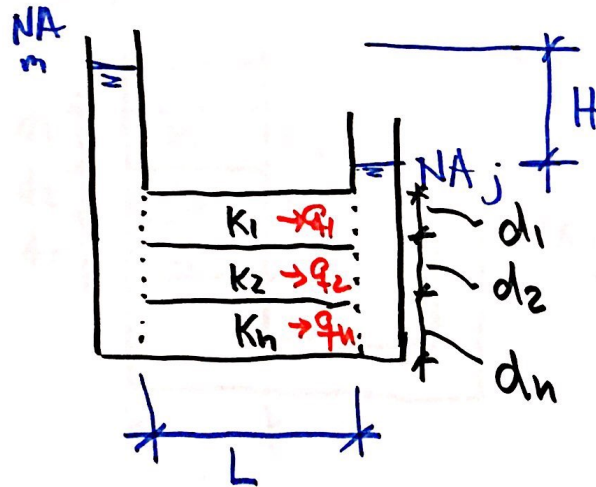
continuidade: $v_{1n} = v_{2n}$

$$i = \frac{v}{k} \quad i_1 = i_2 \quad \frac{v_{1t}}{k_1} = \frac{v_{2t}}{k_2}$$

$$\left. \begin{array}{l} \frac{k_1}{k_2} = \frac{\text{tg } \alpha_1}{\text{tg } \alpha_2} \end{array} \right\}$$

Anisotropia / Heterogeneidade

(2)



Camadas em
PARALELO

$$i = \frac{H}{L} = \text{cte para todas as camadas}$$

$$Q = q_1 + q_2 + \dots + q_n = \sum q_i$$

$$Q = \sum K \frac{\Delta H}{L} A = \sum K \frac{H}{L} d$$

$$Q = \frac{H}{L} \sum K_i d_i \Rightarrow \frac{QL}{H} = \sum K_i d_i \text{ (1)}$$

$$K_m = \text{m\u00e9dia} \quad Q = \frac{H}{L} K_m \sum d_i$$

$$\frac{QL}{H} = K_m \sum d_i \text{ (2)}$$

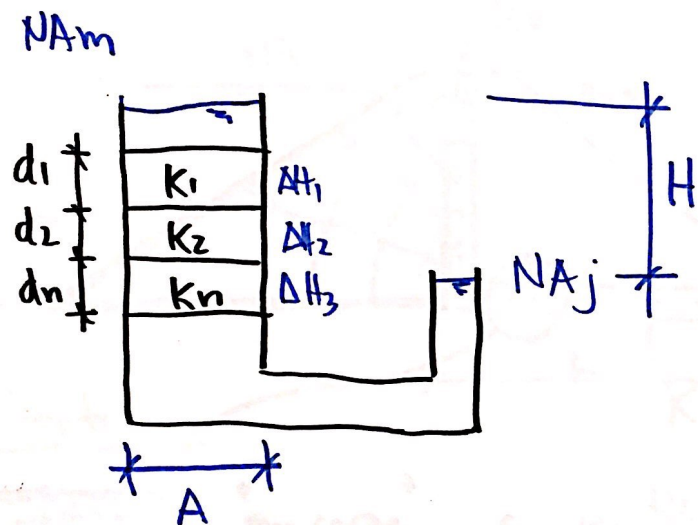
(1) + (2)

$$K_m = \frac{\sum K_i d_i}{\sum d_i}$$

m\u00e9dia ponderada

Heterogeneidade - CAMADAS EM SÉRIE

(9)



$$H = \sum H_i$$

$$Q = k_i A = k_i \frac{H}{\sum d_i} A$$

$$\frac{h_i}{d_i} = \frac{Q}{k_i \cdot A} \Rightarrow h_i = \frac{Q}{A} \frac{d_i}{k_i}$$

$$H = \sum h_i = \frac{Q}{A} \sum \frac{d_i}{k_i}$$

média:
 $Q = k_m \frac{H}{\sum d_i} A$

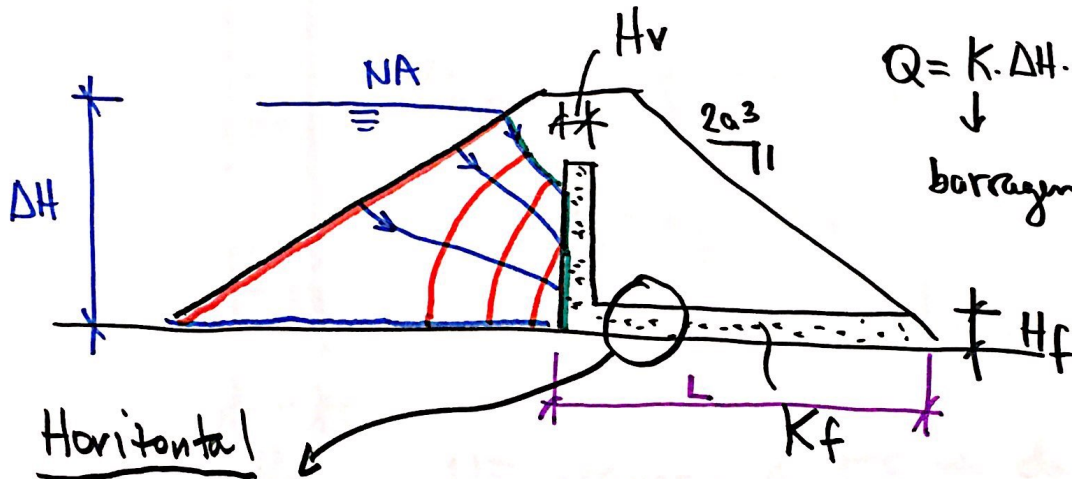
$$k_m \cdot H = \frac{Q}{k_m} \frac{\sum d_i}{A} = \frac{Q}{A} \sum \frac{d_i}{k_i}$$

$$k_m = \frac{\sum d_i}{\sum (d_i/k_i)}$$

média harmônica

Espessura do filtro da Barragem

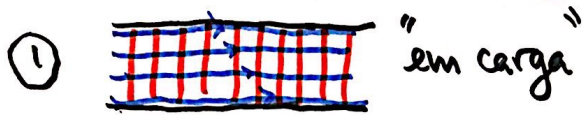
n° de canais de fluxo ⁽⁴⁾



$$Q = K \cdot \Delta H \cdot \frac{N_f}{N_q} = \text{vazão na barragem}$$

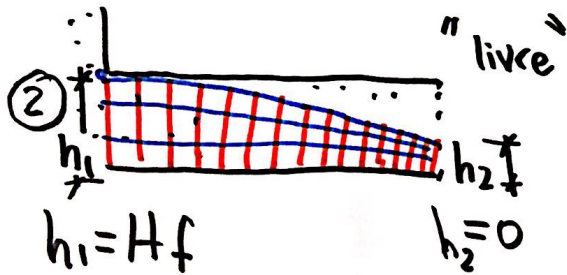
N_f = número de quedas equipotenciais

Horizontal



$$Q = K_f \frac{H_f}{L} H_f = K_f \frac{H_f^2}{L}$$

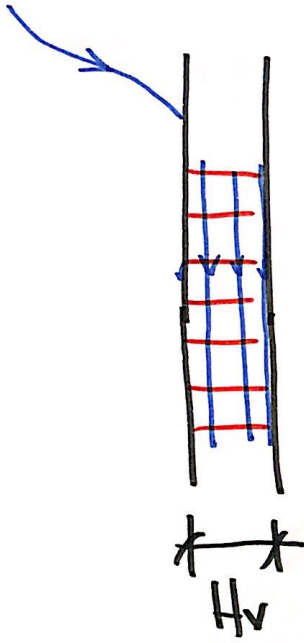
$$H_f = \sqrt{\frac{Q \cdot L}{K_f}}$$



eq. Dupuit

$$Q = \frac{K}{2L} (h_1^2 - h_2^2) = \frac{K H_f^2}{2L}$$

$$H_f = \sqrt{\frac{2QL}{K}}$$



Filtro Vertical

fluxo vertical: $\Delta H = \Delta z \rightarrow i = 1,0$

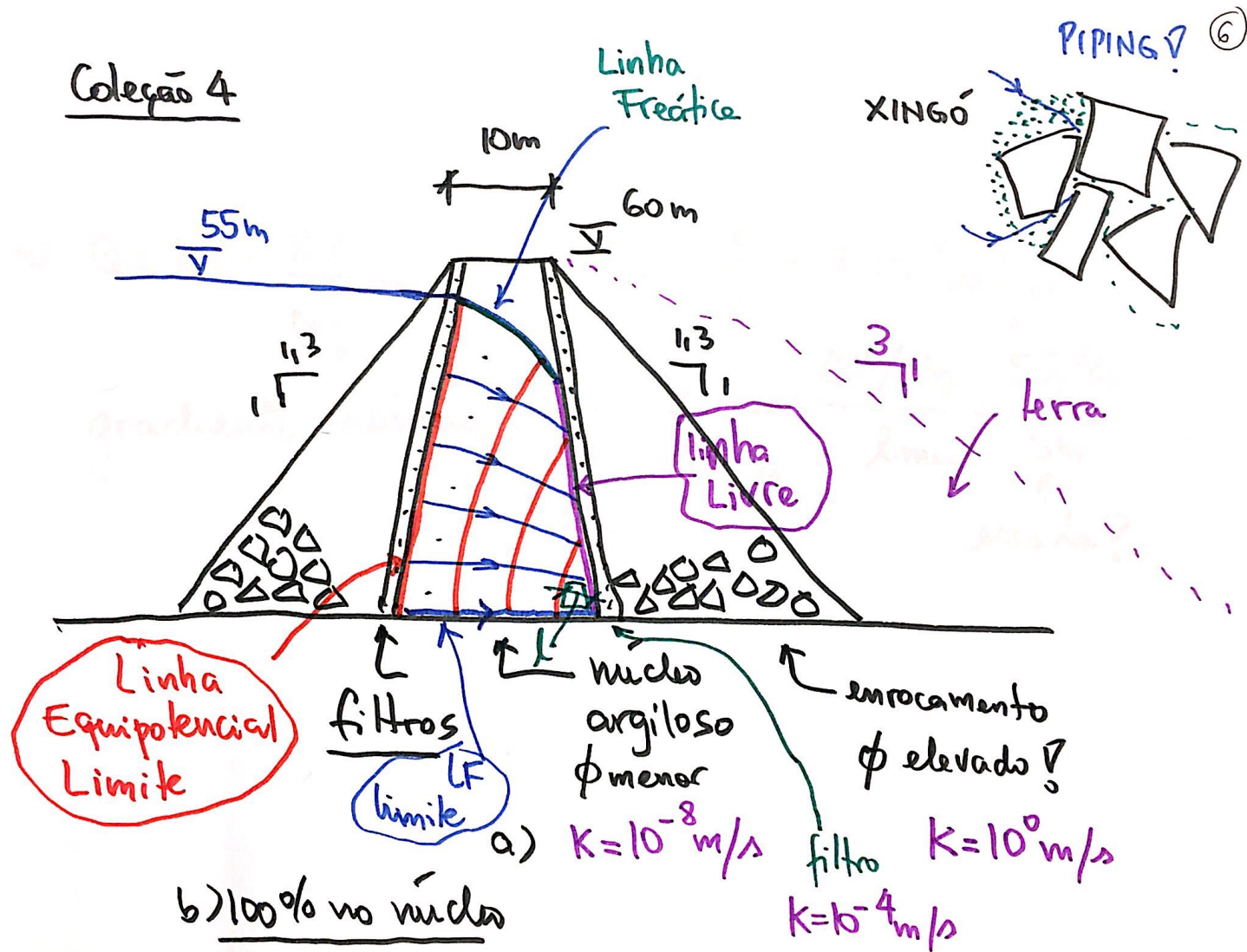
$$Q = k_f \cdot i \cdot H_v$$

↑
 i_0

$$H_v = \frac{Q}{k_f}$$

Não esquecer de F.S. \Rightarrow da ordem de 10^{-2}

Coleção 4



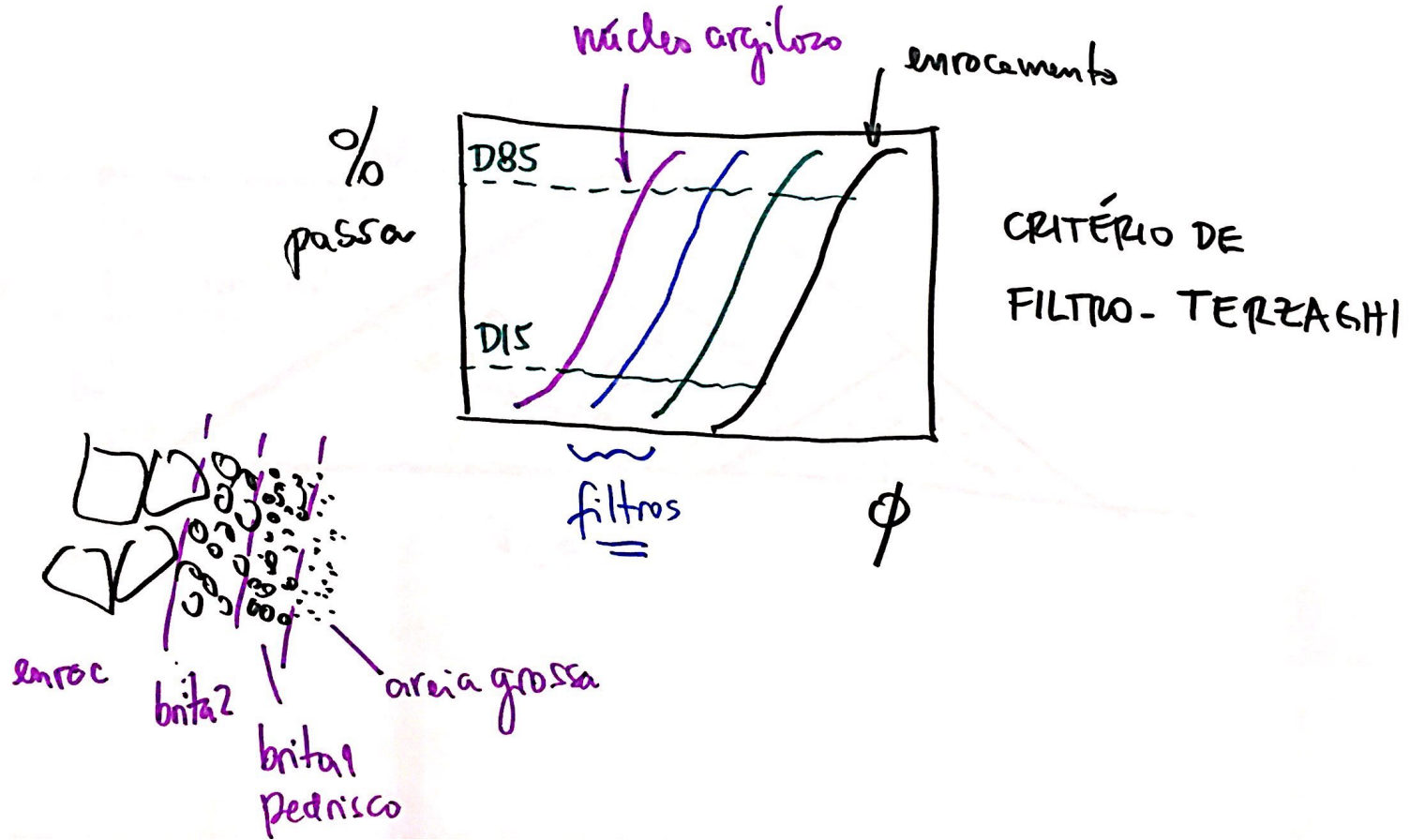
7

$$e) Q = k \Delta H \frac{N_f}{N_g} = 10^{-8} \frac{\text{m}}{\text{s}} \cdot 55 \text{m} \cdot \frac{5}{4} = 7 \times 10^{-7} \text{m}^3 / \text{s} \cdot \text{m}$$

gradiente máximo $\Rightarrow i = \frac{\Delta h}{l} = \frac{\Delta H / N_g}{l_{\text{min}}} = \frac{55/4}{5 \text{m}} = \underline{\underline{2,7}}$

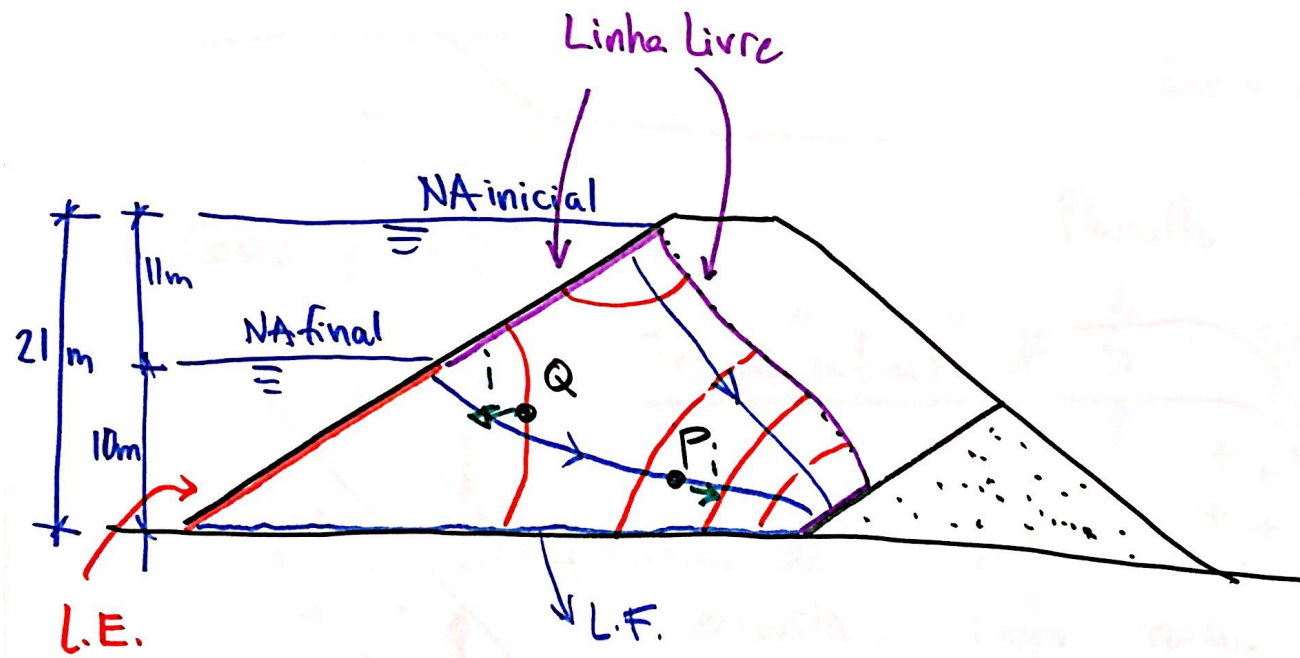
\downarrow max \rightarrow min \uparrow escala?

Dimensionamento de Filtros



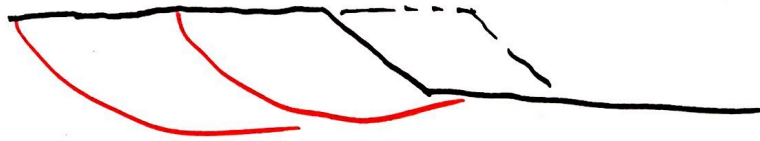
Ex 2 :

9

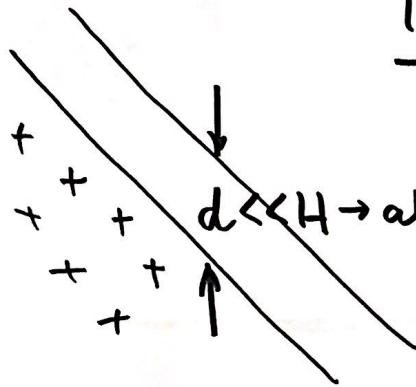


ESTABILIDADE DE TALUDES

10



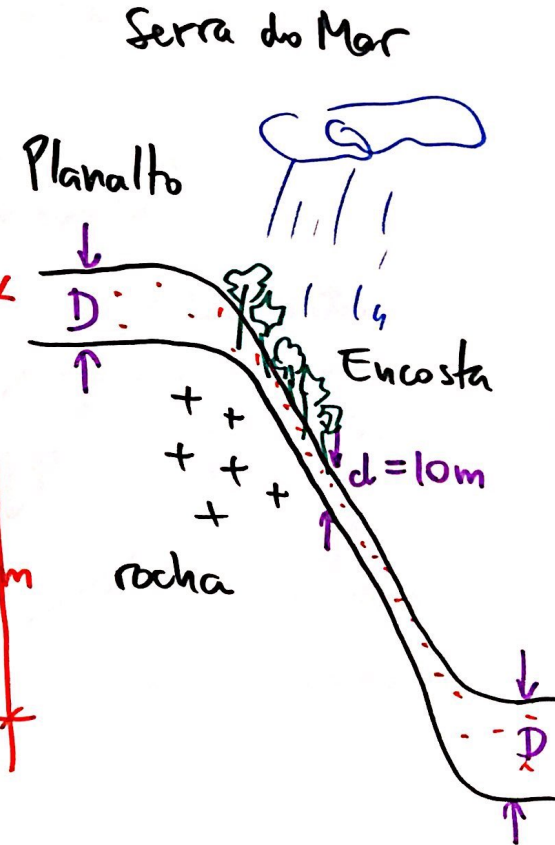
Casos principais



Talude "infinito"

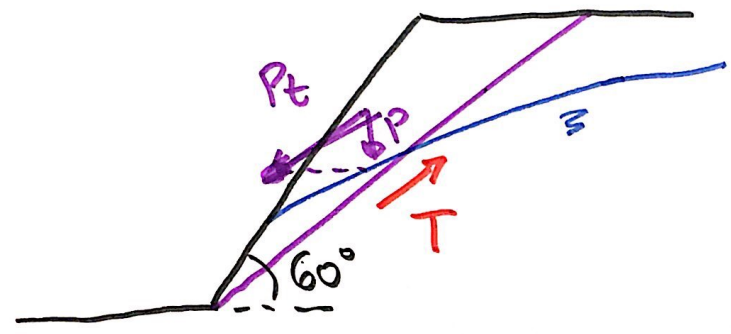
$d \ll H \rightarrow$ altura da encosta.

H
700m



Tabulelo "Ingrene" - Culmann

$$\tau = c + \sigma \tan \phi$$



Situacao "Genérica"

