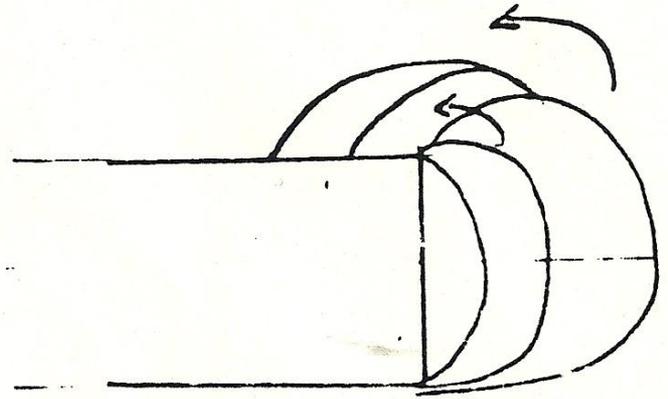
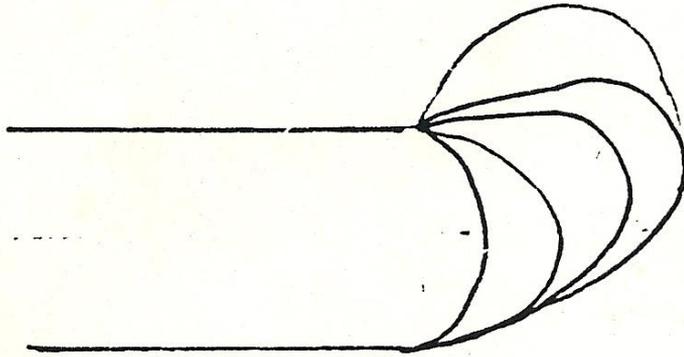
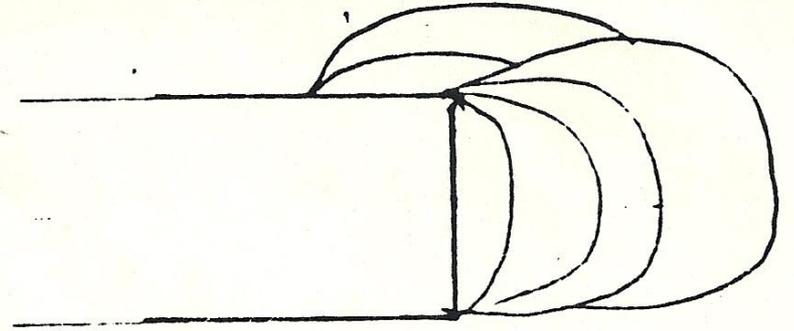
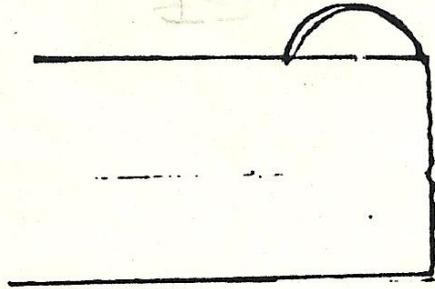
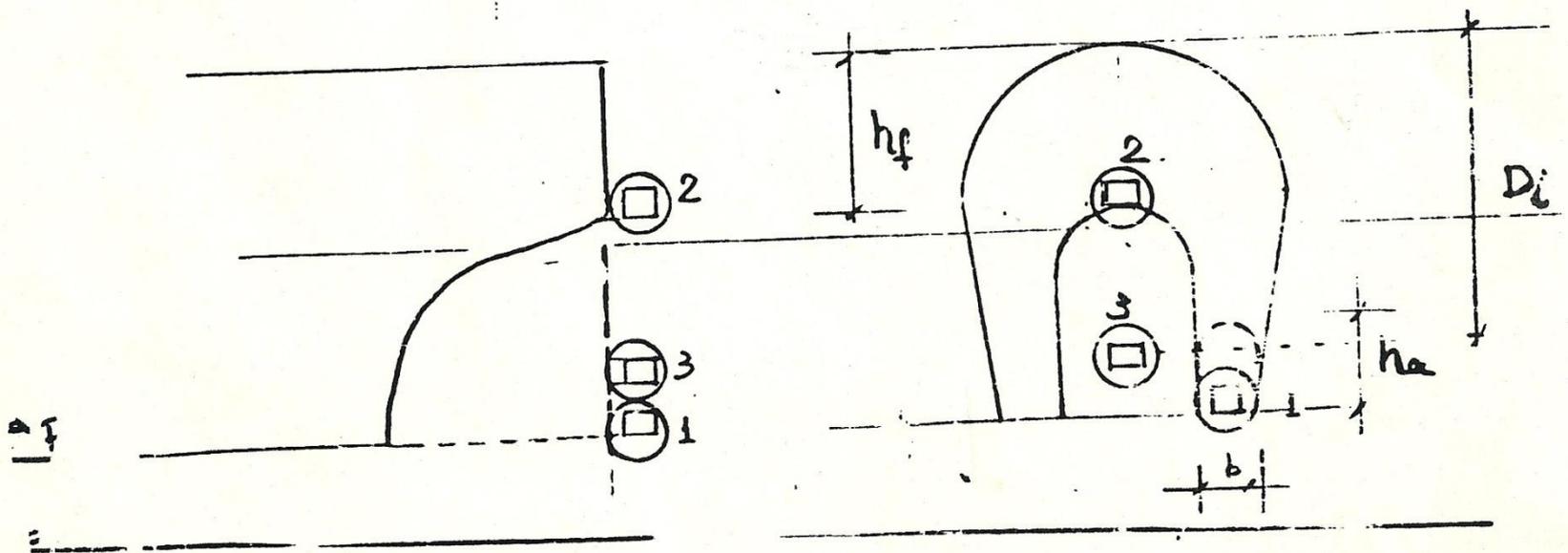
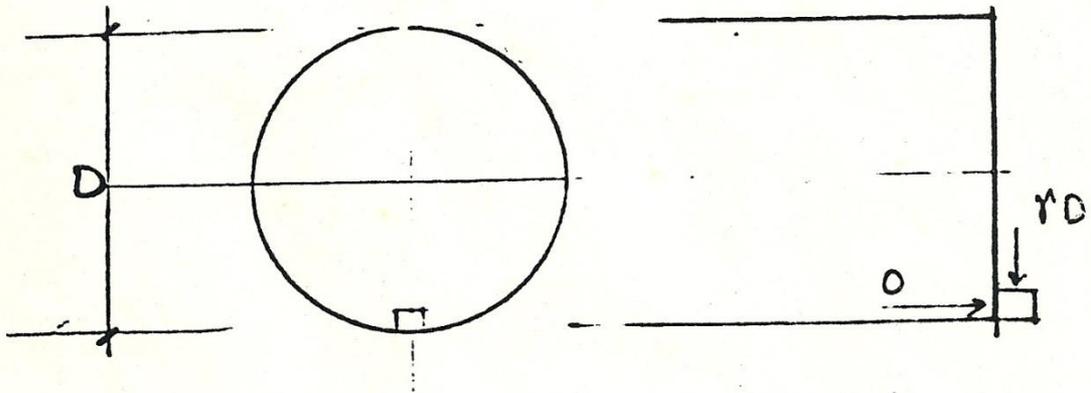


AULA

21-09-2012



ESTABILIDADE DE TETO



estas

$$\sigma_1 =$$

ESTABILIDADE DE FRENTE

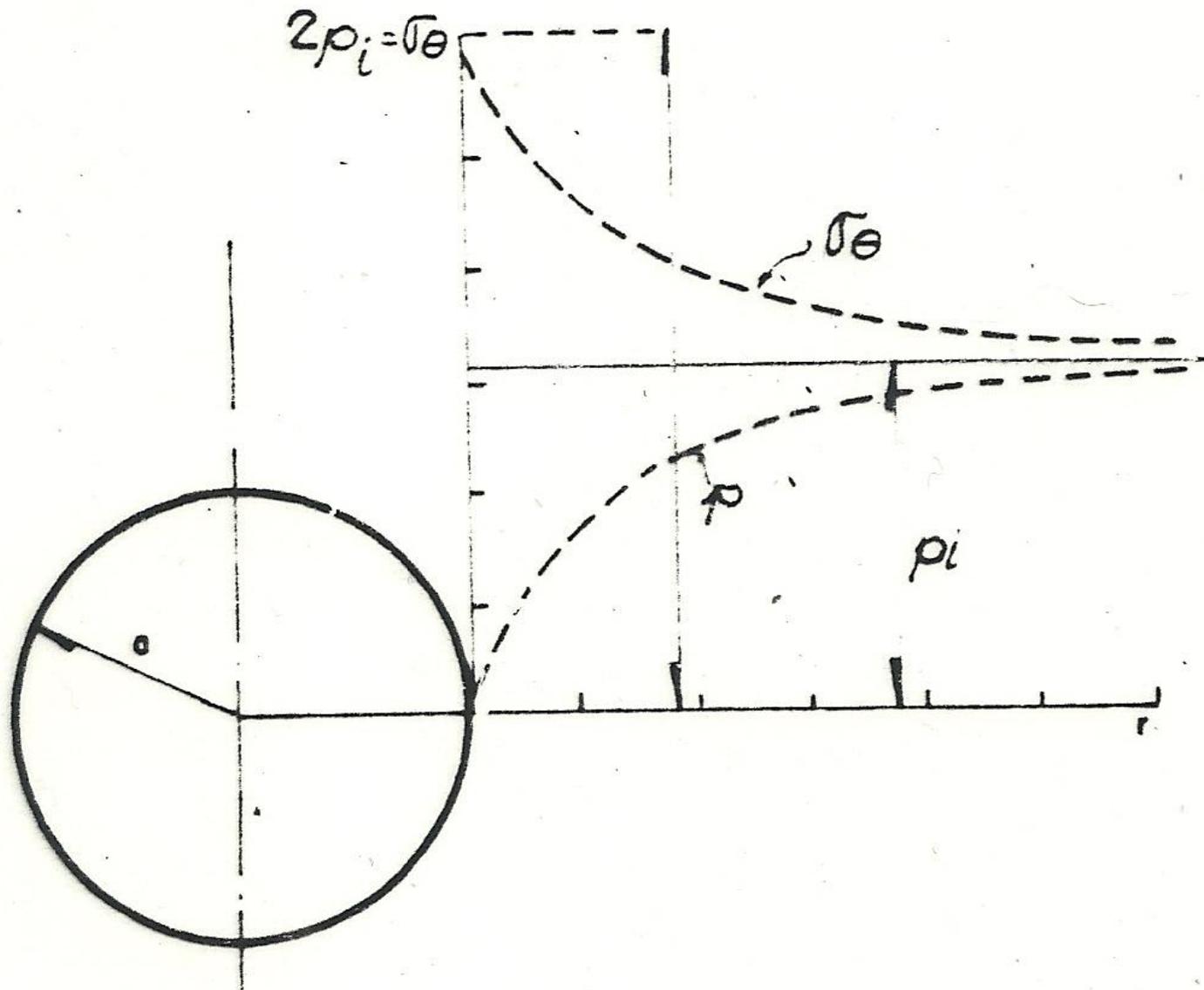
$$\alpha_1 =$$

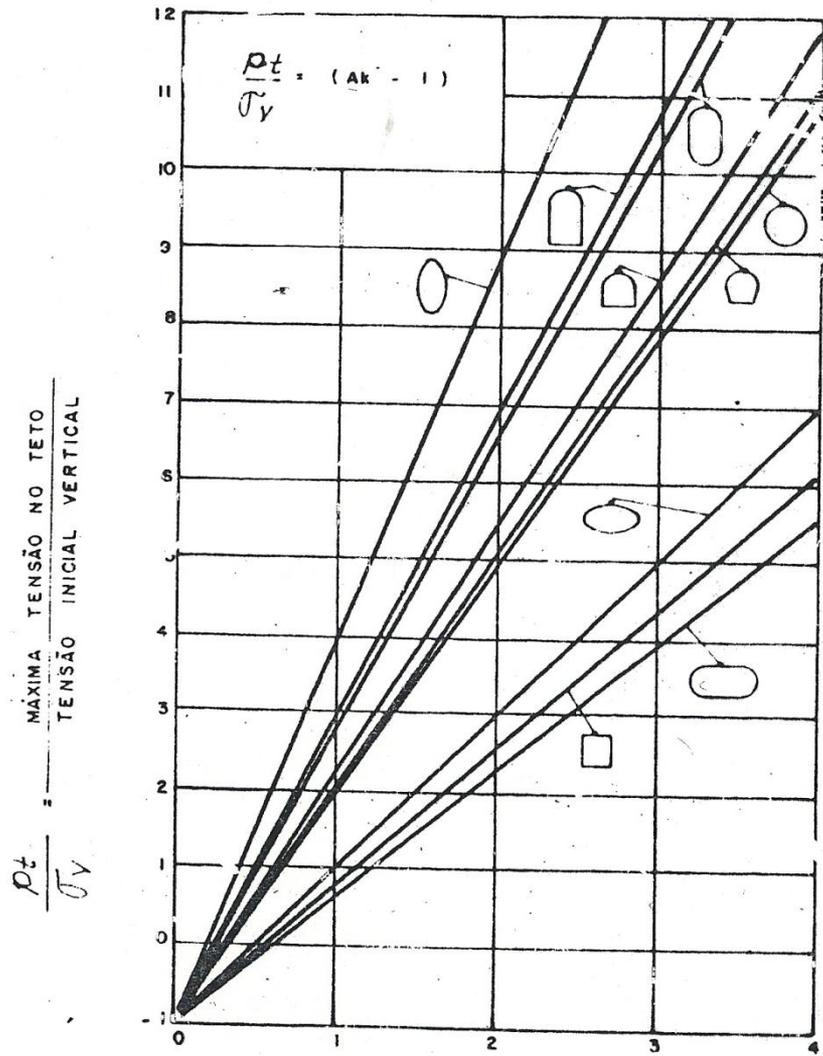
ABGE'82

Dr. Mosze Gitelman

Dr. Maffei

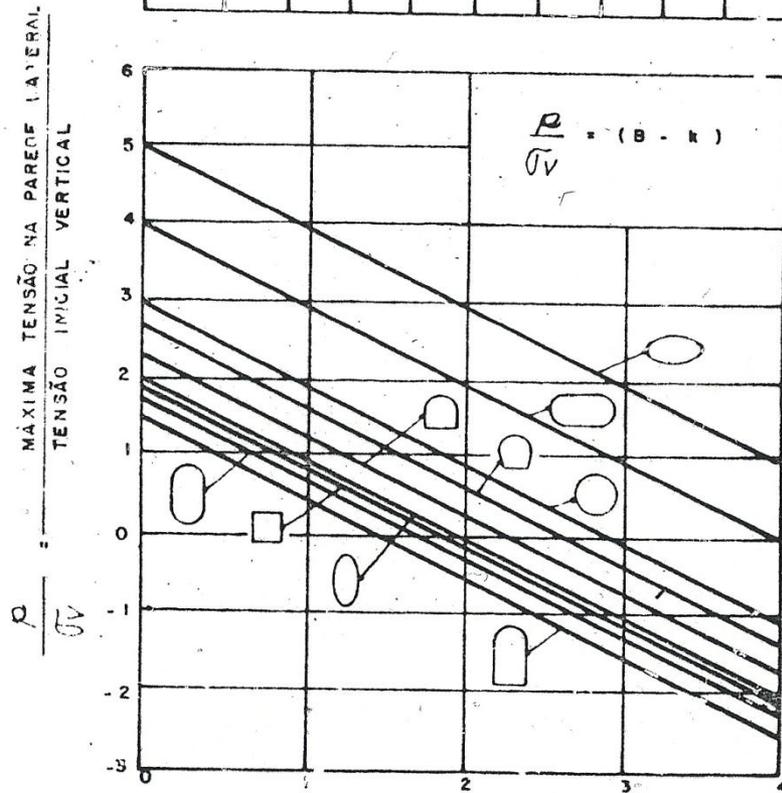
- Distribuição das tensões nas vizinhanças de abertura.
equilíbrio elástico – arqueamento
equilíbrio elasto-plástico
- Curvas características do maciço.
< Convergência – Confinamento >
- Curvas características do suporte.
- Efeito Tridimensional.





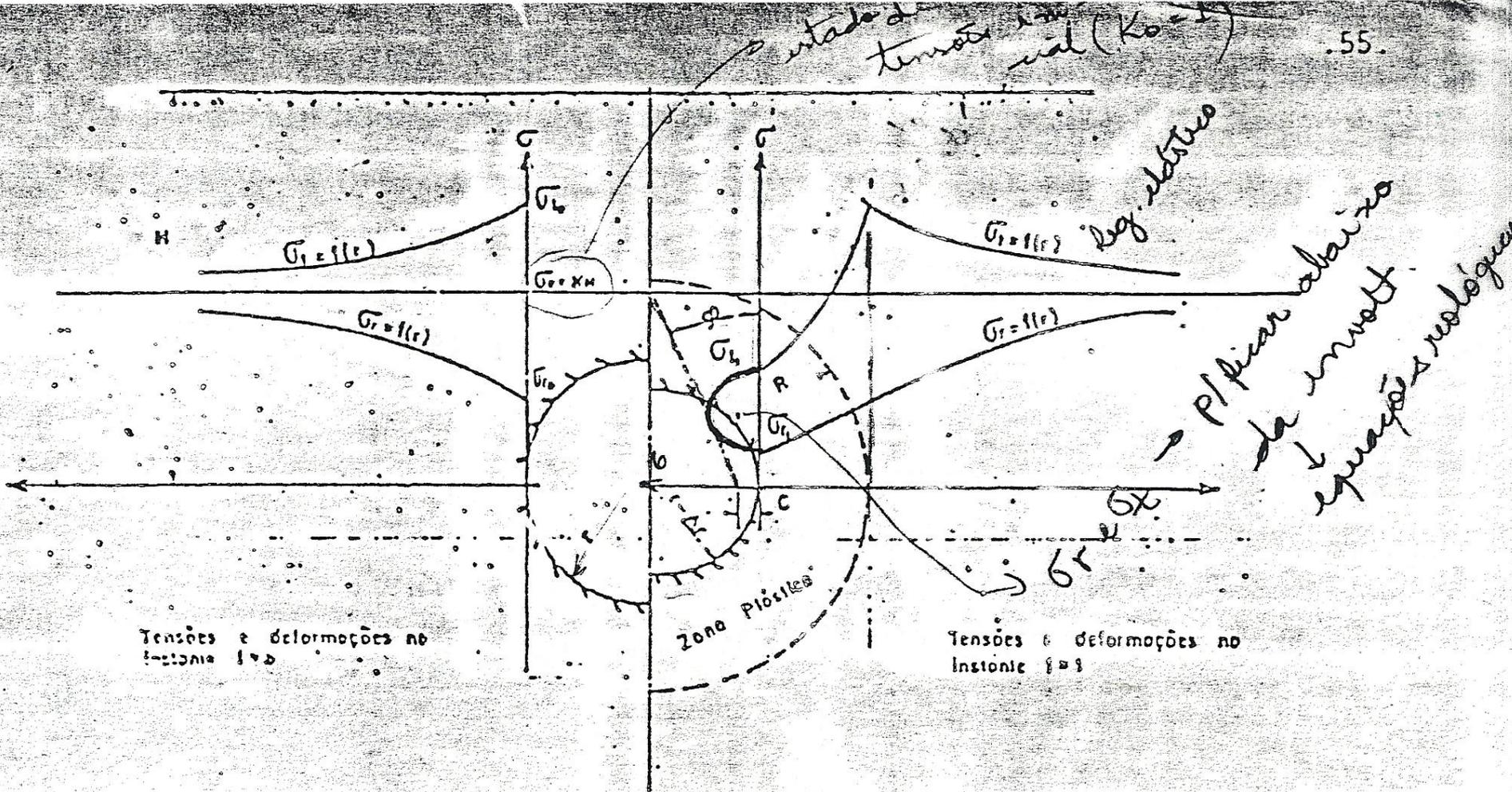
$$K = \frac{\sigma_H}{\sigma_v} = \frac{\text{TENSÃO INICIAL HORIZONTAL}}{\text{TENSÃO INICIAL VERTICAL}}$$

A	5.0	4.0	3.9	3.2	3.1	3.0	2.0	1.9	1.8
B	2.0	1.5	1.8	2.3	2.7	3.0	3.0	1.9	3.



$$B = \frac{\text{TENSÃO INICIAL HORIZONTAL}}{\text{TENSÃO INICIAL VERTICAL}}$$

estado de tensões elásticas ($K_0 = 1$)



Tensões e deformações no instante $t = 0$

Tensões e deformações no instante $t = t_1$

P/fixar abaixo da equação nologues

Aplicando-se P' de apenas 1 kgf evita-se a ruptura da barra. Portanto, o suporte não é obrigado a fornecer 1000 kgf para evitar a ruptura da barra.



$P_{rupt} = 1000 \text{ kgf}$

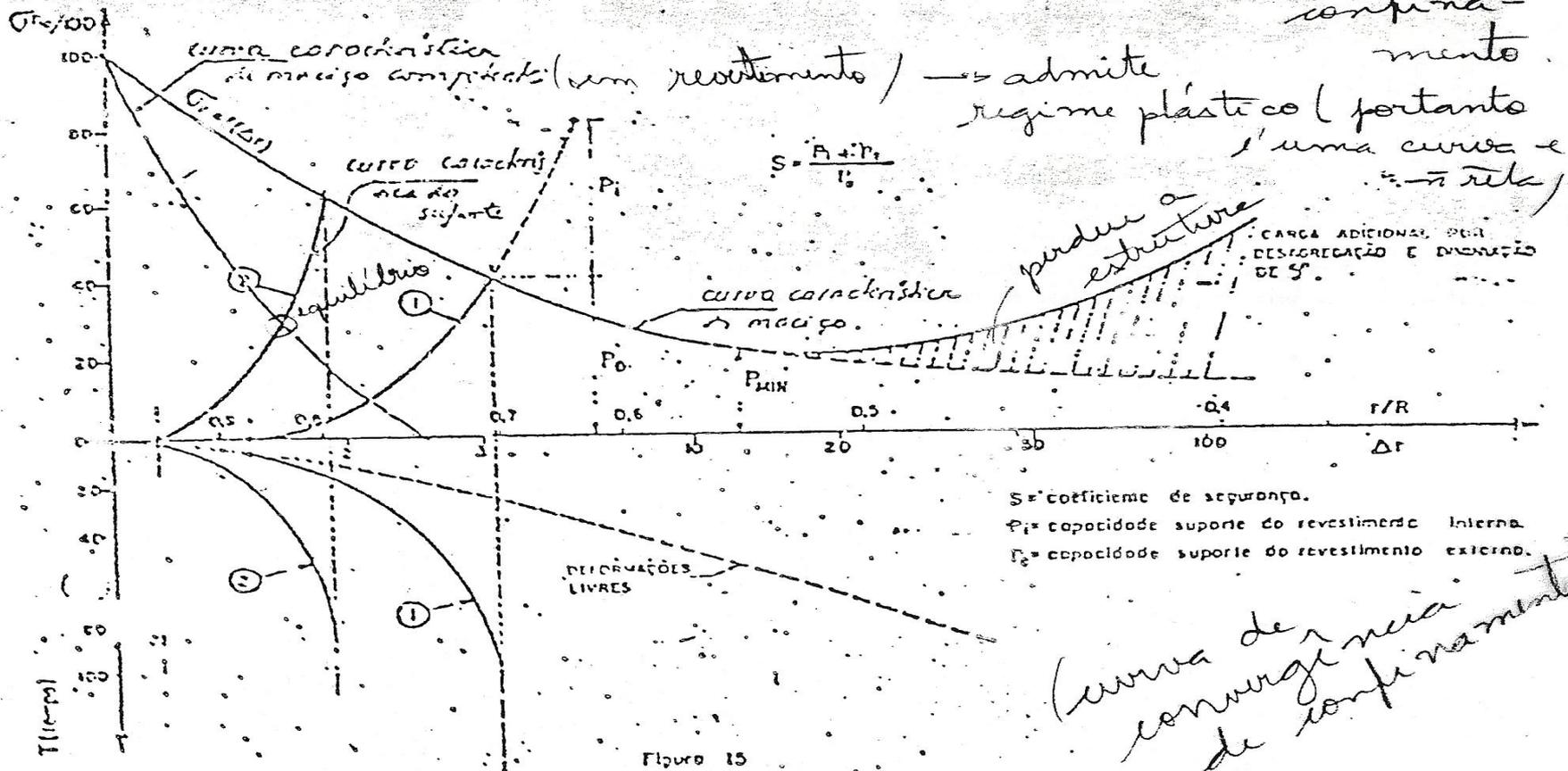


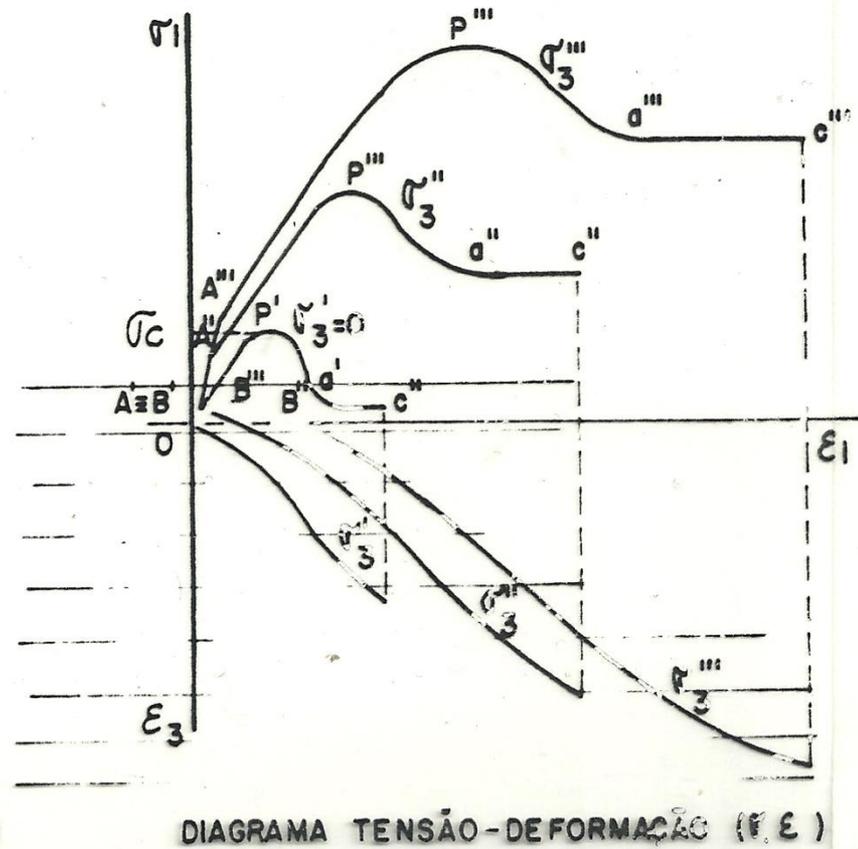
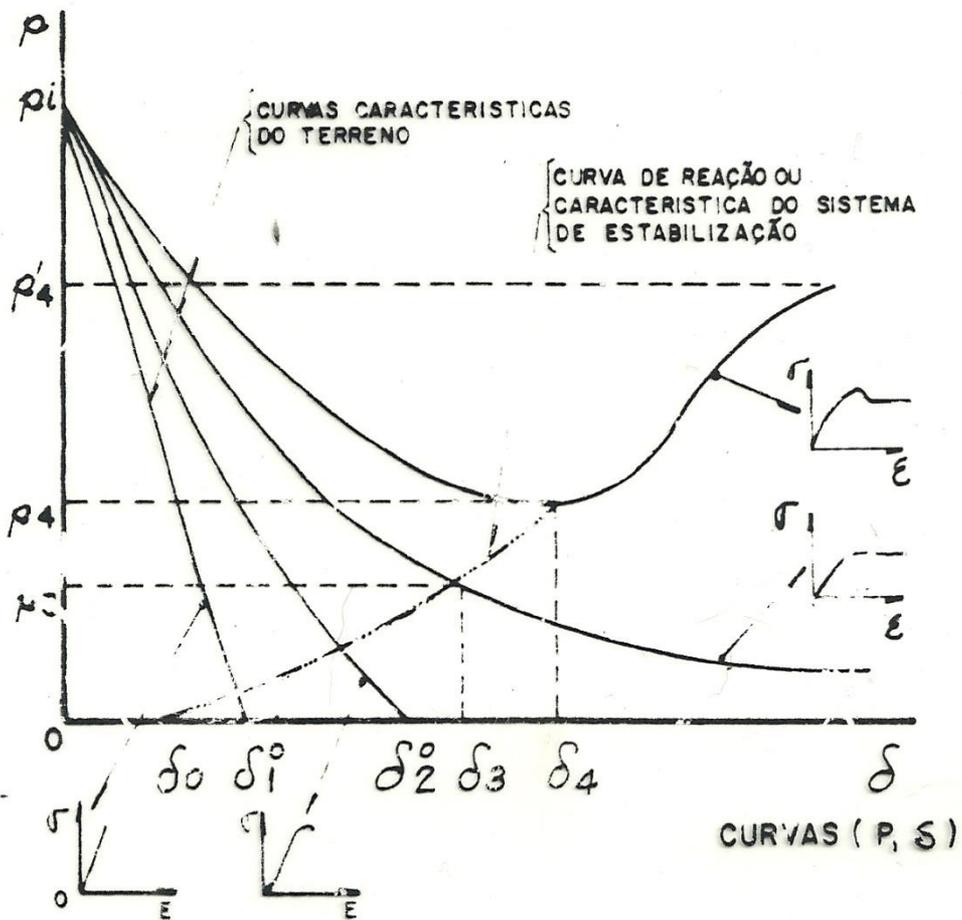
← maciço

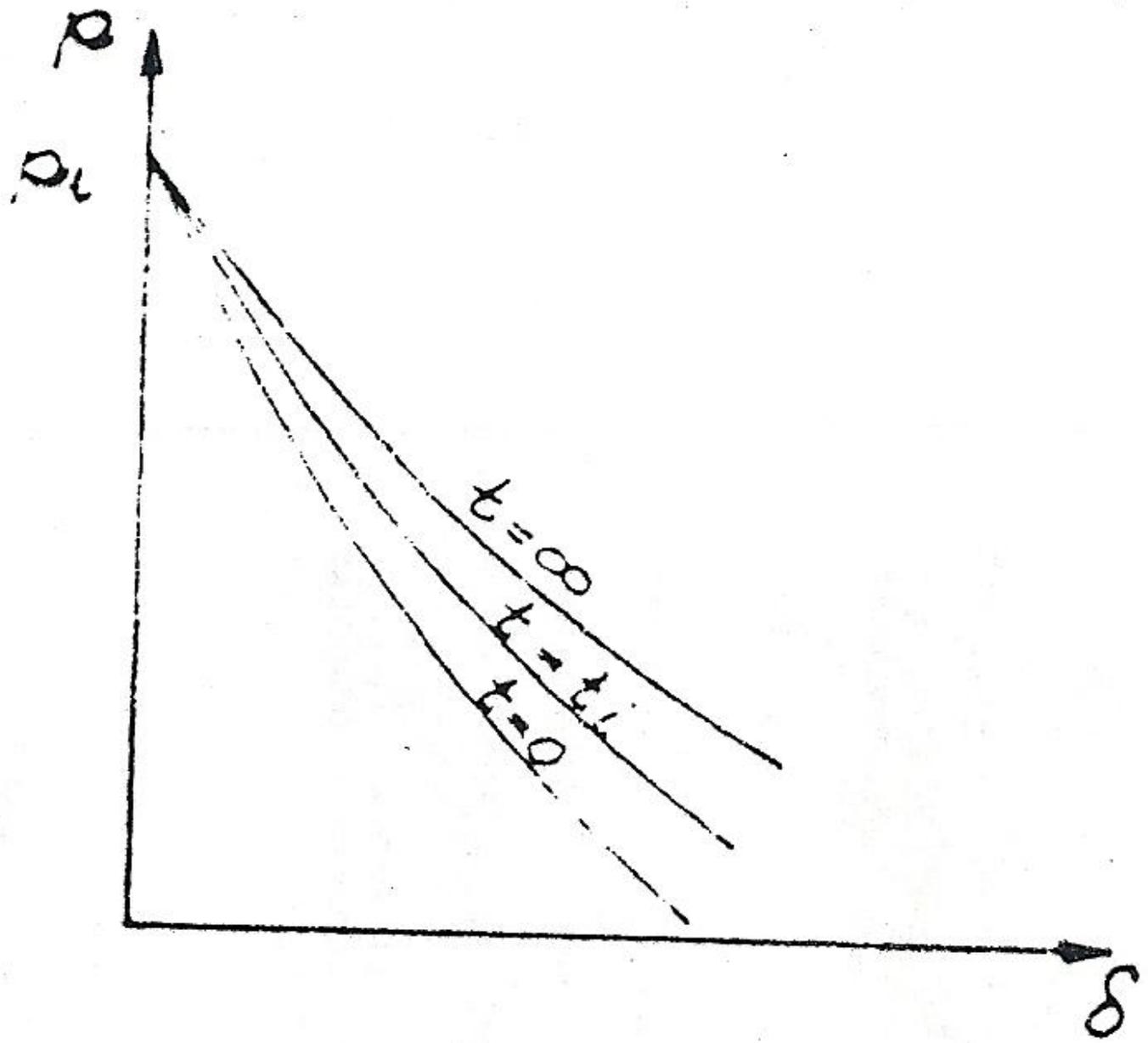
↓ P_{rupt}

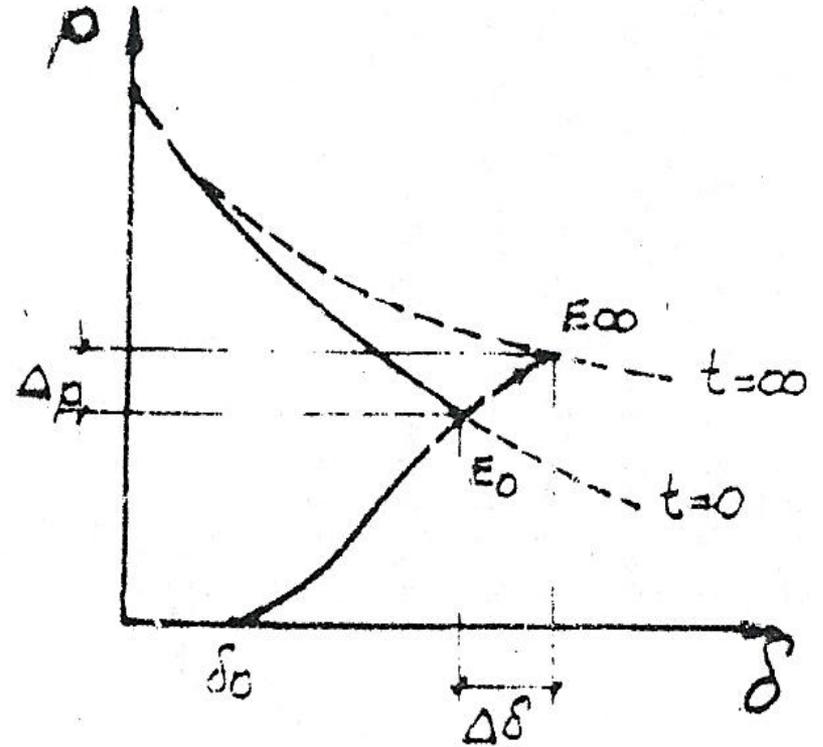
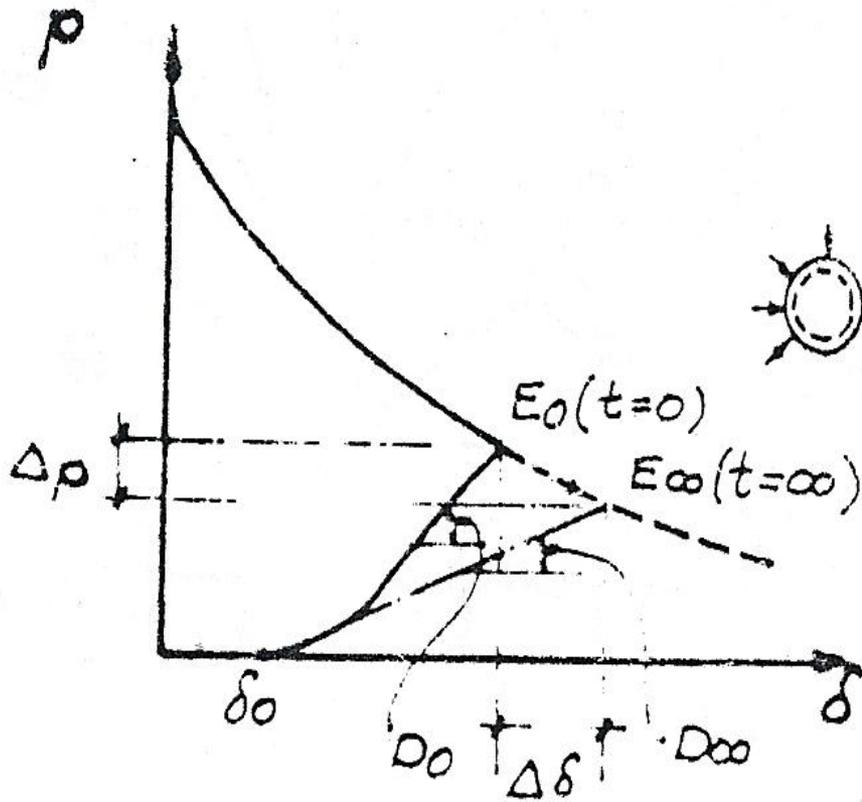
↑ $P' = 1 \text{ kgf}$ ← suporte

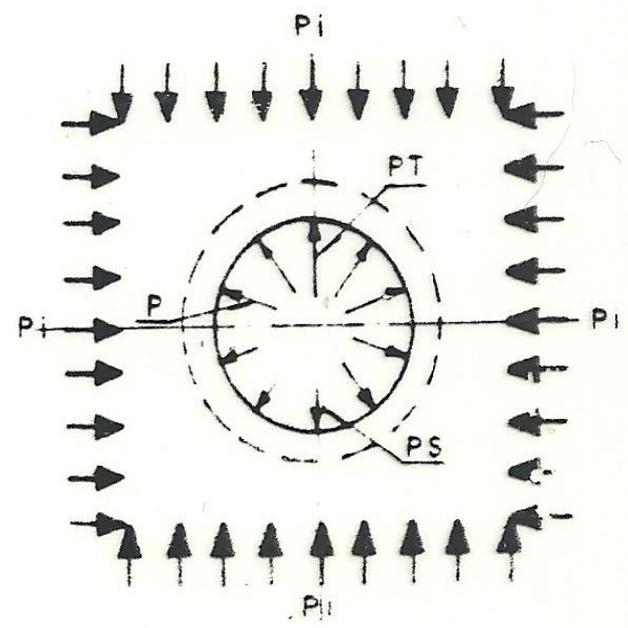
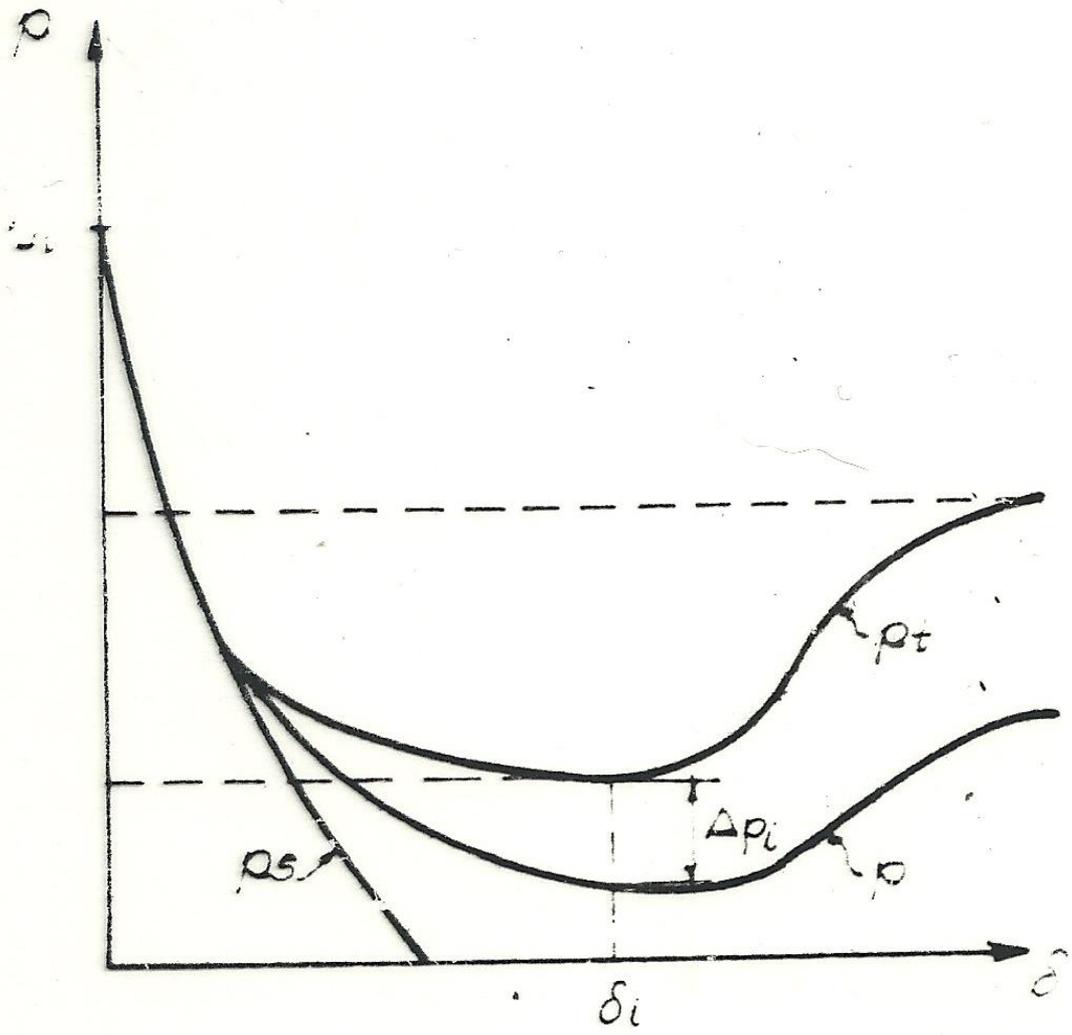
confinamento

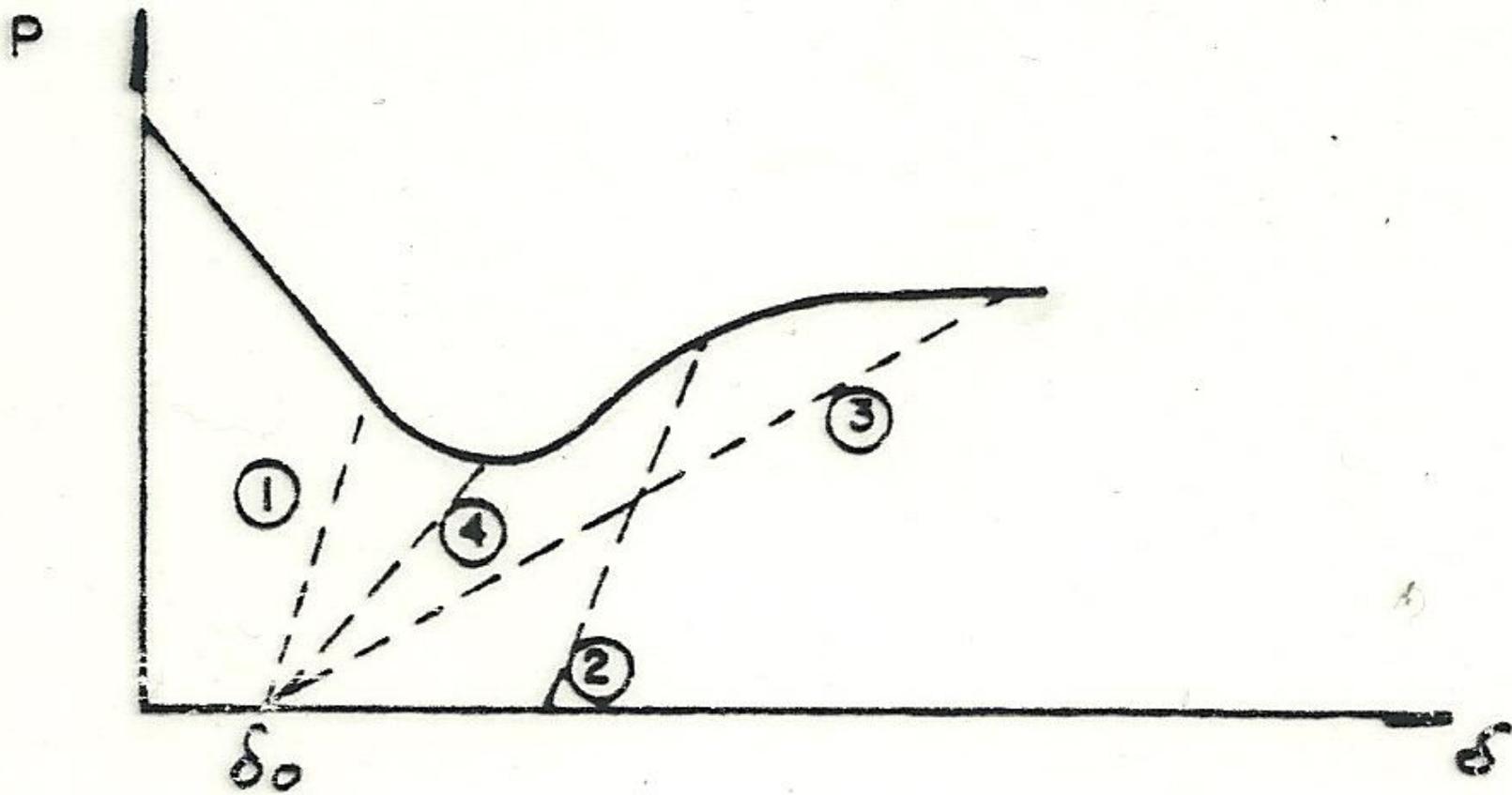


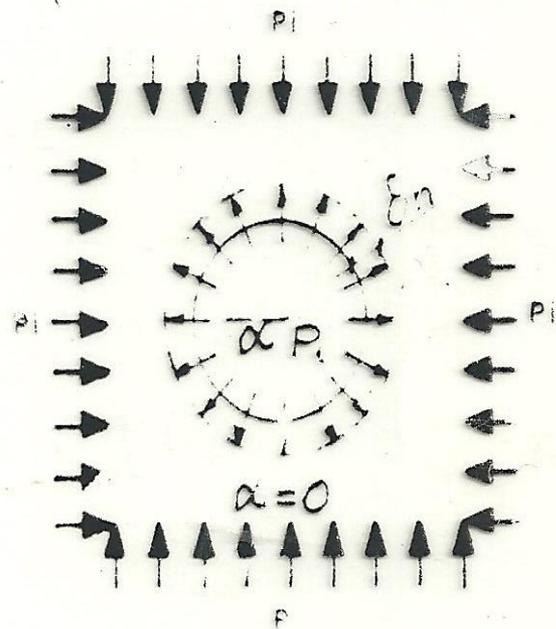
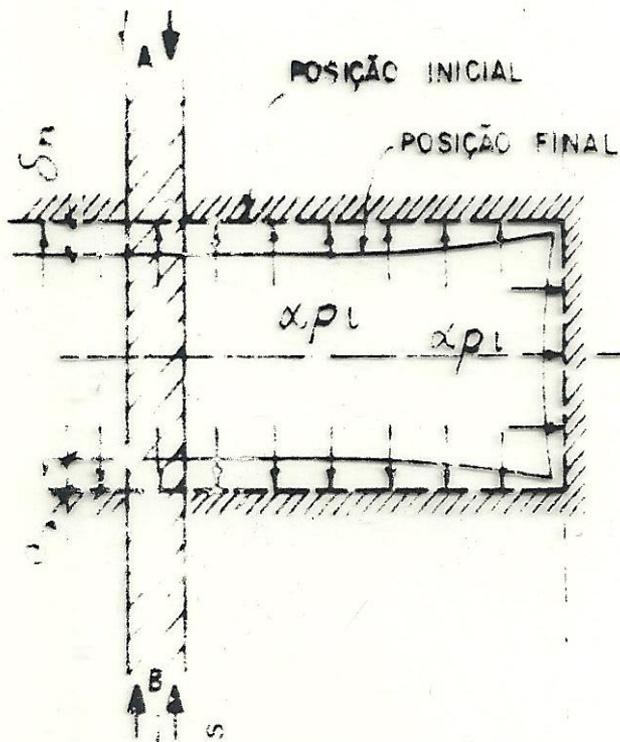




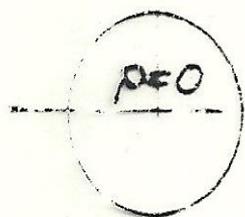








SEÇÃO A-B



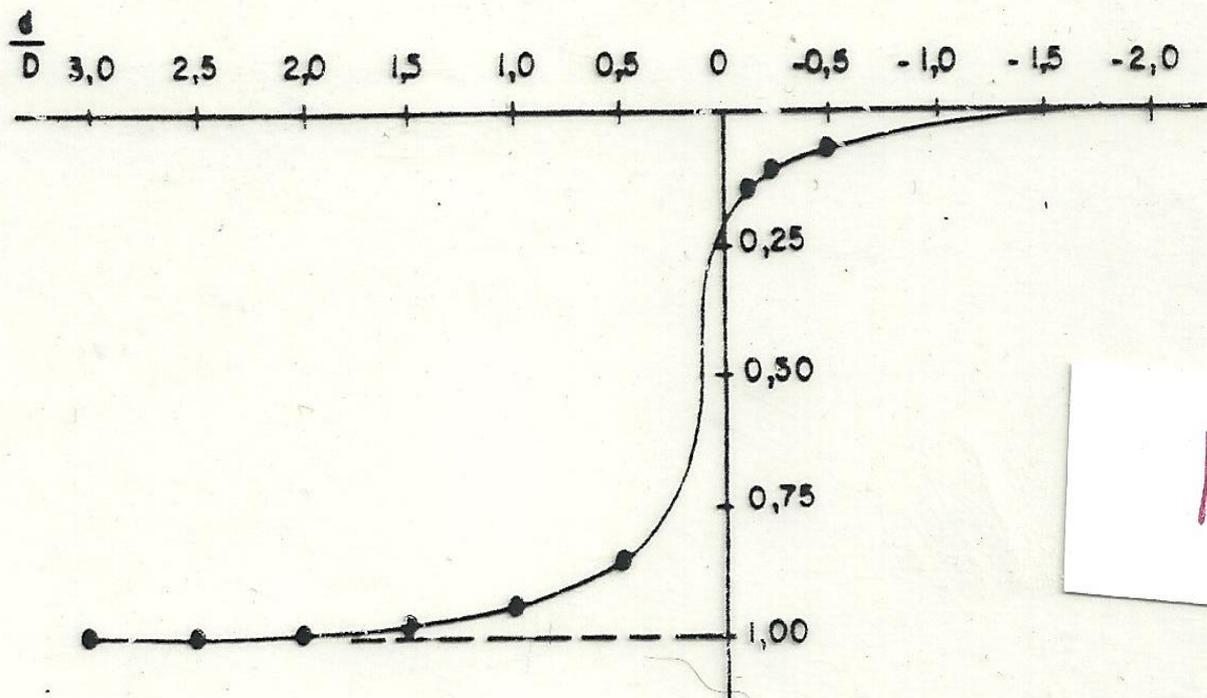
$$\alpha = 0$$



$$0 < \alpha < 1$$

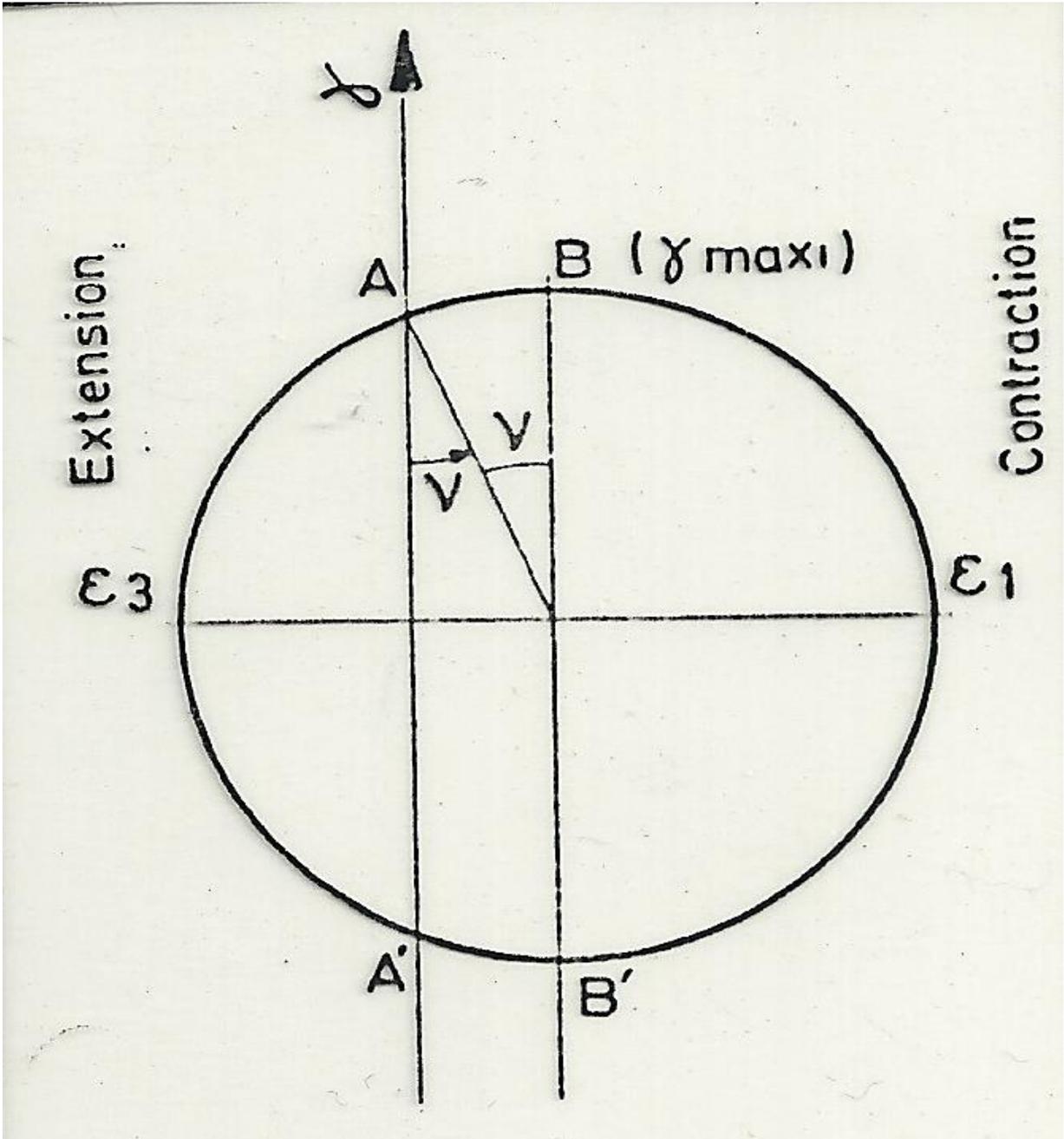


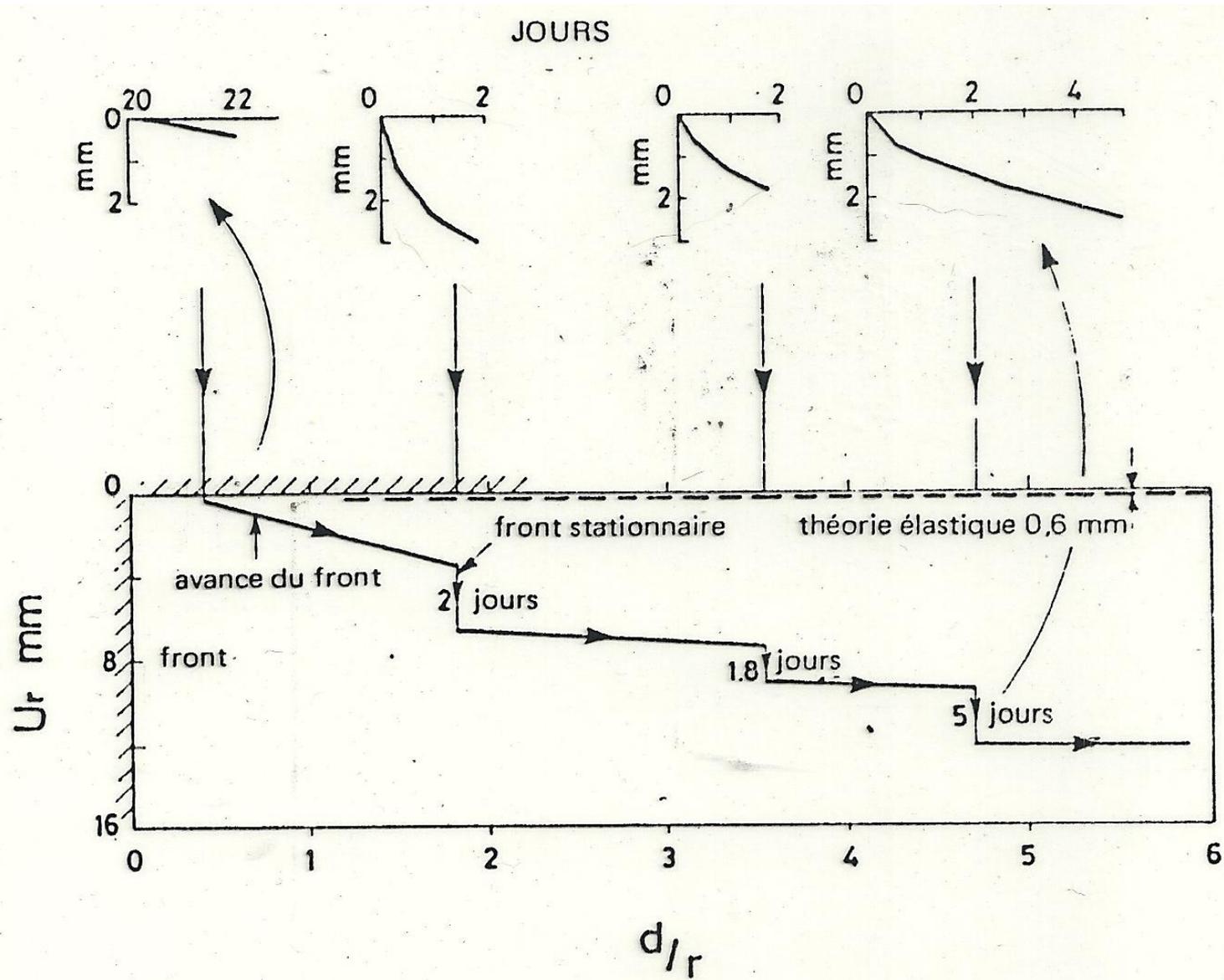
$$\alpha = 1$$



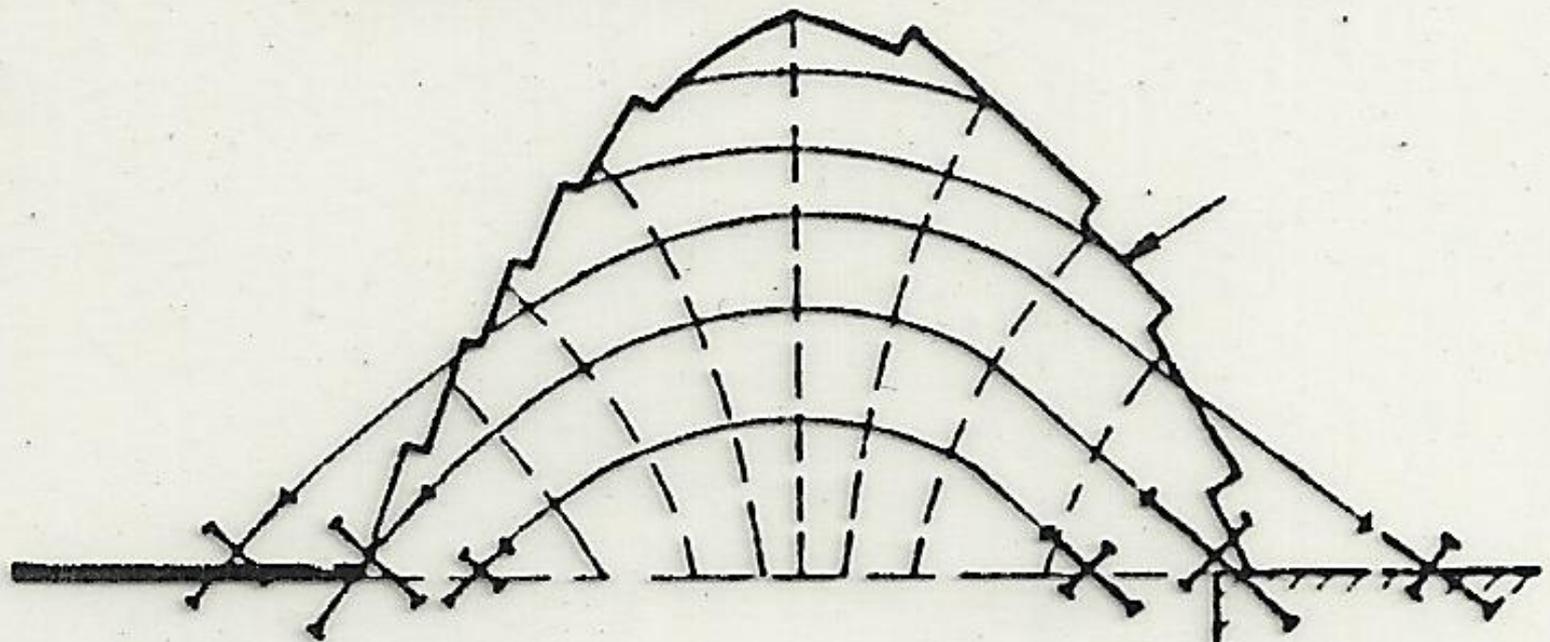
Möbse

$\frac{\delta}{\delta_n}$

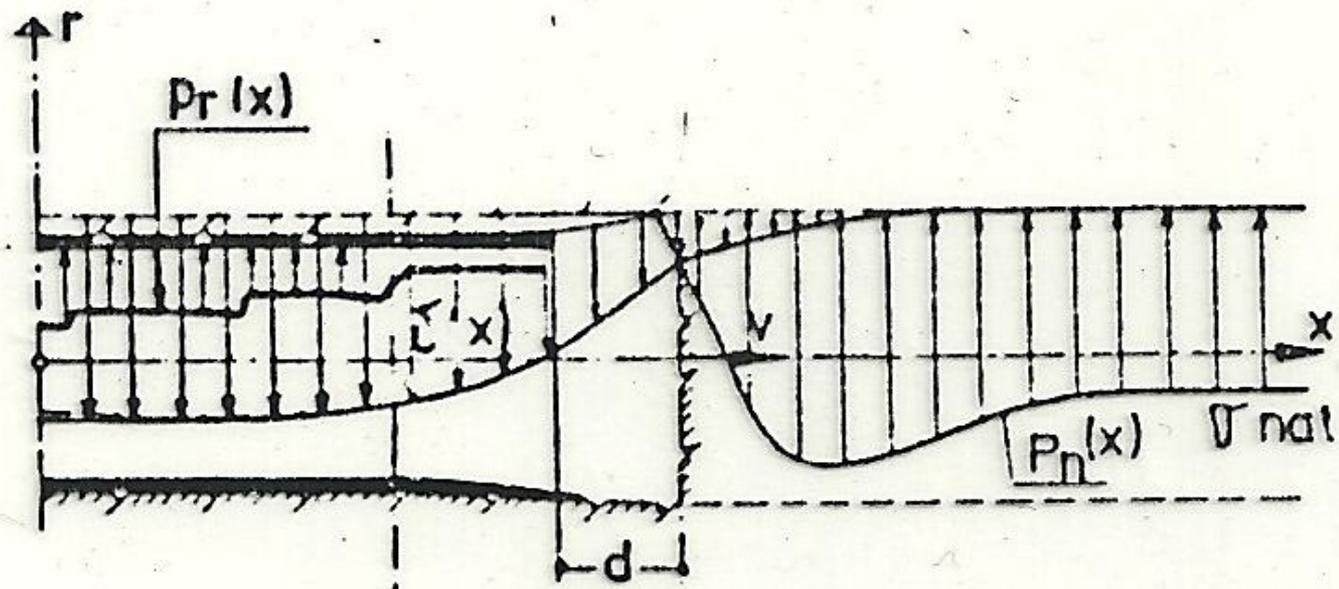




Double famille de lignes de rupture

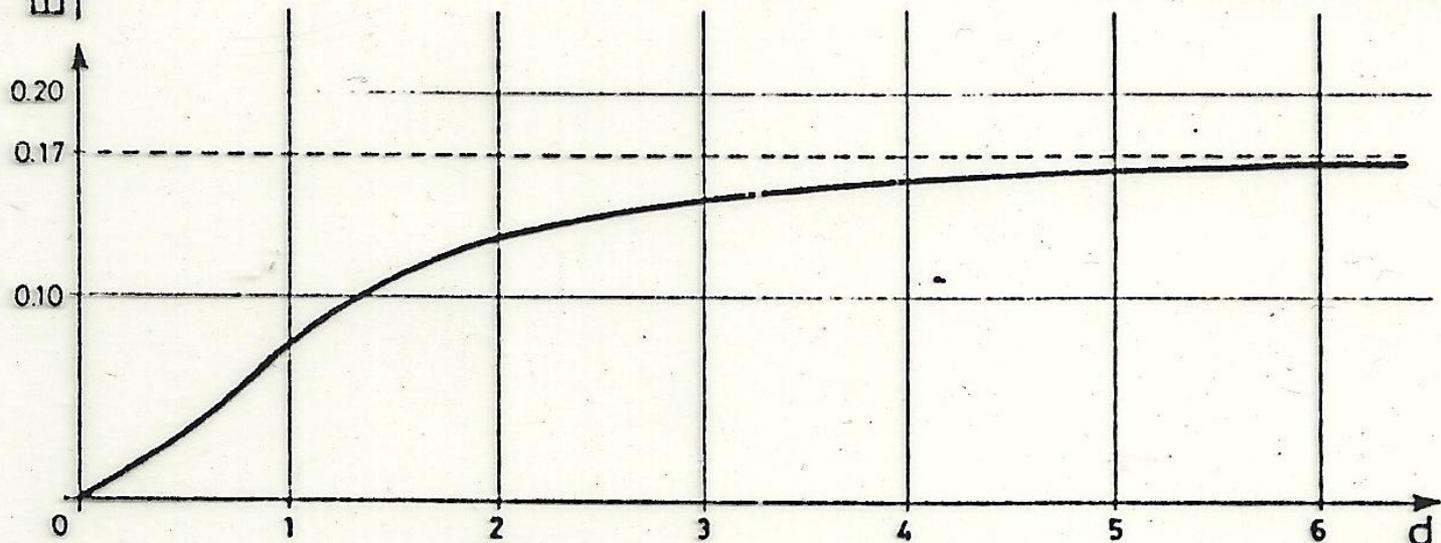
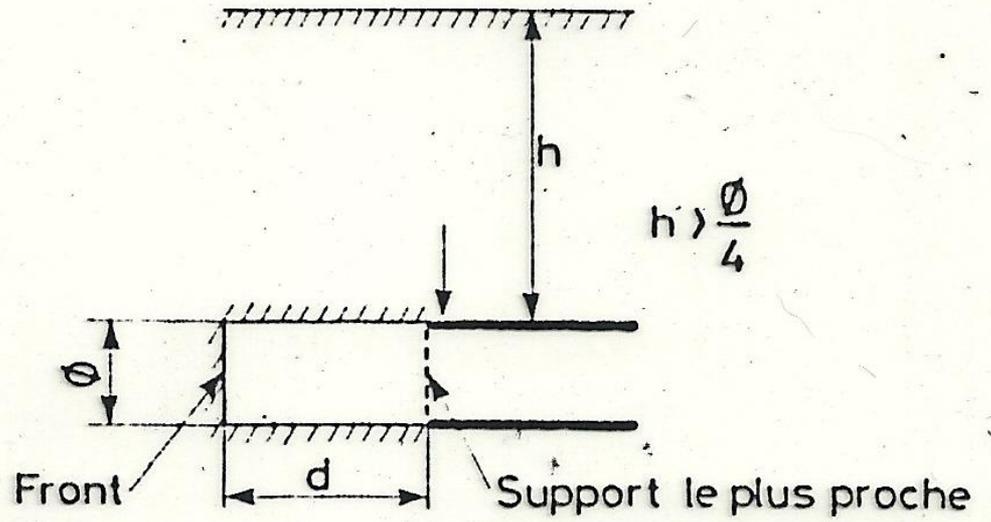


- — — Contraintes principales maxi
- - - Contraintes principales mini



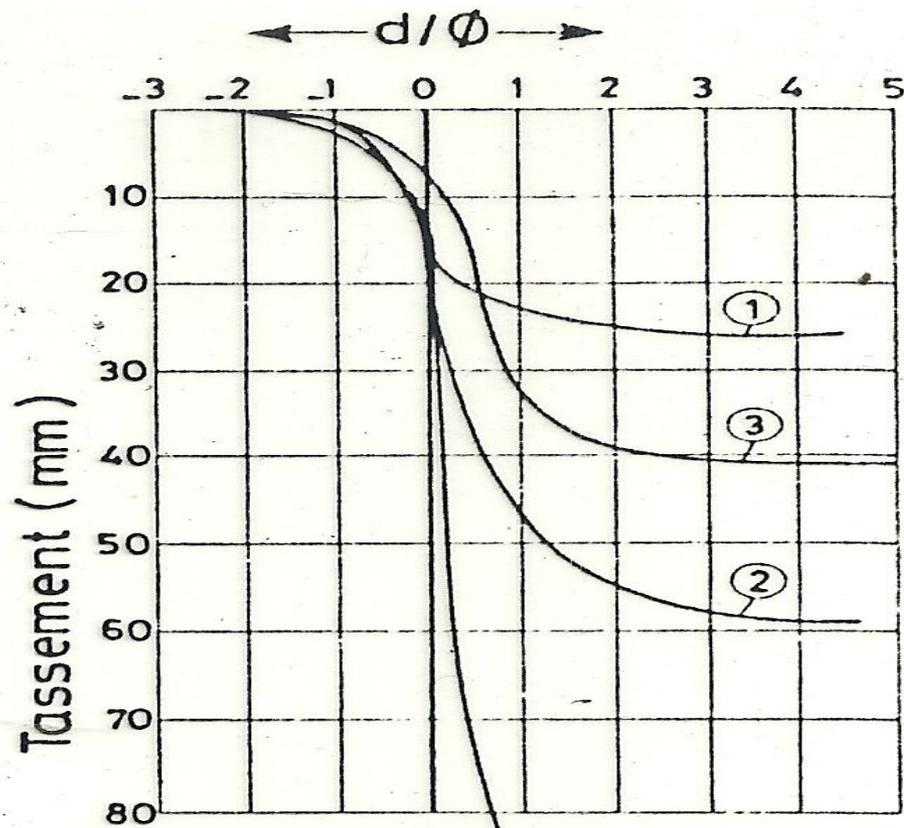
- (C) v = vitesse avancement
 (A) $P_n(x)$ = charge sur noyau
 $P_r(x)$ = charge sur revêtement
 $\sigma(x)$ = déformation radiale

Effort tranchant
 $\delta \phi^2$



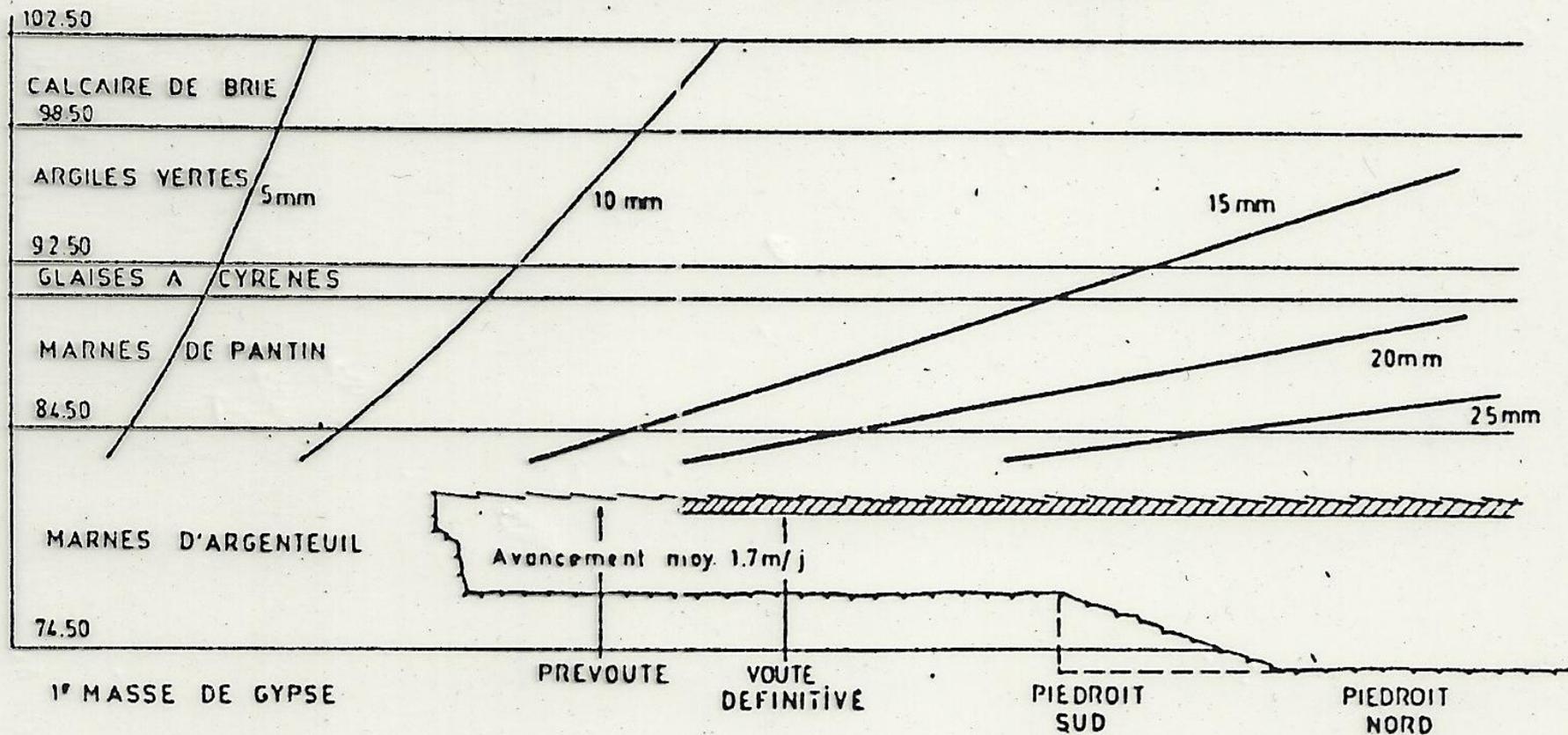
Effet tridimensionnel pour $\varphi_{rés} = 30^\circ$ et $C_{rés} = 0$

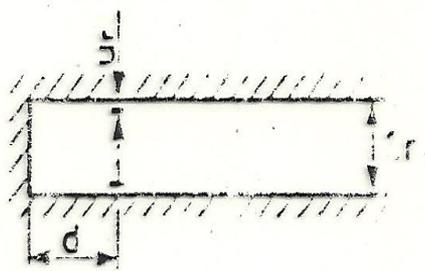
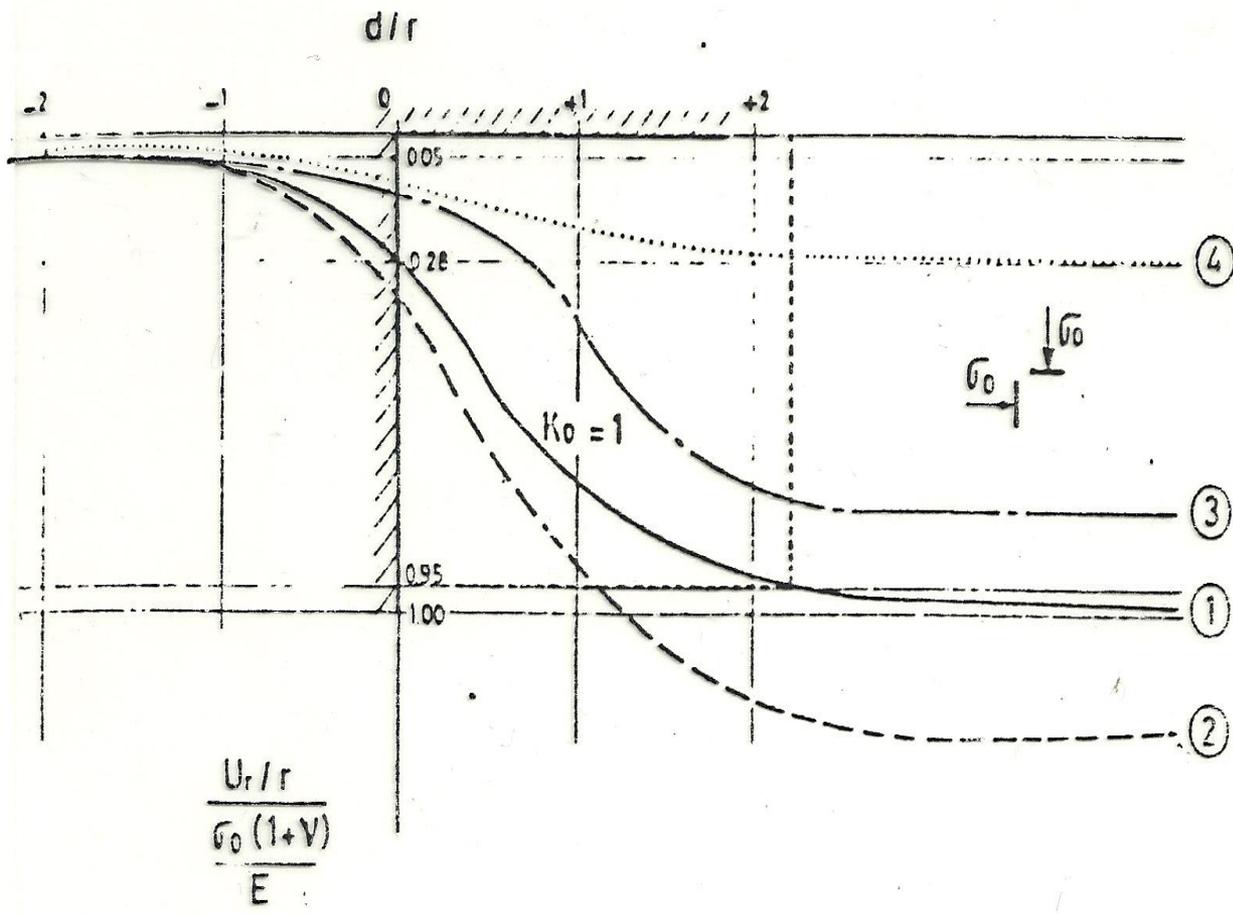
ϕ/d



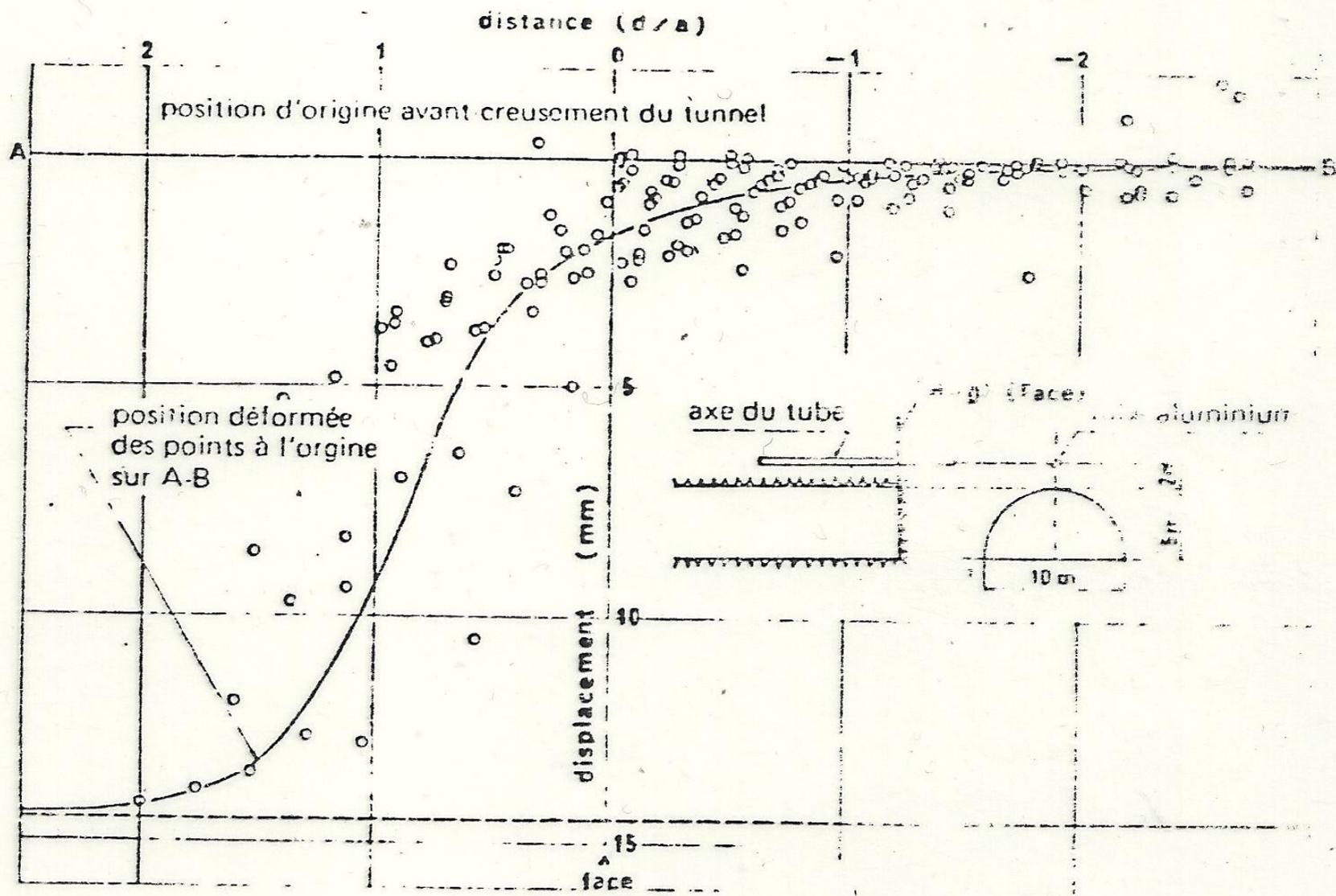
- 1 Francfort - béton projeté
Los 17 CHAMBOSSE (1972)
Ø 6,5 argile surconsolidée
- 2 Francfort - bouclier
Los 25 CHAMBOSSE (1972)
Ø 6,5 argile surconsolidée
- 3 Francfort - bouclier
Los 23 CHAMBOSSE (1972)
Ø 6,5 argile surconsolidée
- 4 Washington - bouclier
Projet A2 HANSMIRE (1975)
Ø 6,4 sable limoneux

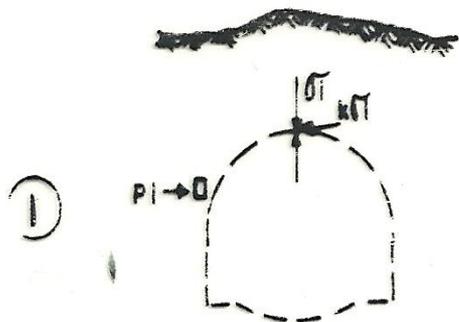
R.E.R à FONTENAY/BOIS COURBES D'EGAL TASSEMENT



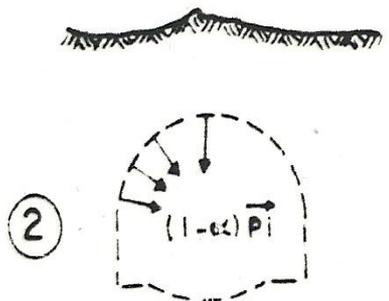


- ① HOCKING
Hypothèse élastique l.c.
- ② FRANCFORT
Los 25, bête projeté
- ③ FRANCFORT
Los 23, boullier
- ④ FONTENAY
Prédécoupage

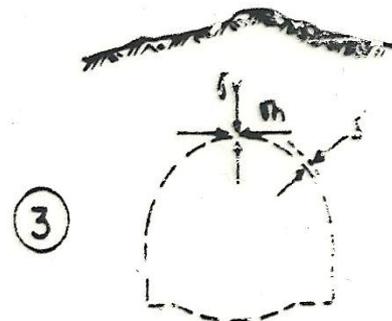




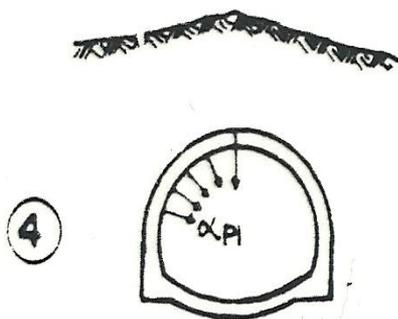
ESTADO INICIAL DE TENSÃO ANTES DA ESCAVAÇÃO



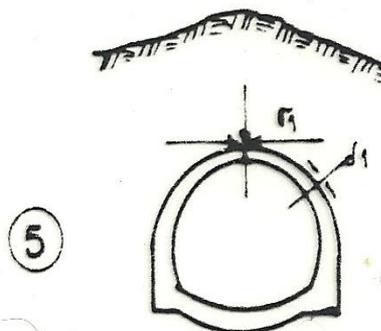
RETIRADA PARCIAL DAS PRESSÕES $(1-\alpha)P_1$ RADIAIS NA FRENTE DEVIDO A ESCAVAÇÃO



- REDISTRIBUIÇÃO DAS TENSÕES
- DEFORMAÇÕES OCORRIDAS NA FRENTE DA ESCAVAÇÃO ANTES DA INSTALAÇÃO DO SISTEMA DE ESTABILIZAÇÃO



- INSTALAÇÃO DO SISTEMA DE ESTABILIZAÇÃO
- RETIRADA DA DIFERENÇA DE PRESSÕES αP_1



- ESTADO FINAL DE TENSÕES NO TERRENO E NO SUPORTE
- DESLOCAMENTOS, FORÇAS NORMAIS, FORÇAS CORTANTES E MOMENTO FLETOR NO SUPORTE
- DIMENSIONAMENTO DO SISTEMA DE ESTABILIZAÇÃO