Ayudantía 5

ICE/IBM2020

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Vamos a ver...

1.- Preguntas previas

2.- Overview Toree 3

3.- Ajuste de parámetros

4.- Modelos constitutivos (iso y anisotrópicos)

Modelos constitutivos

Isotrópico: NH

$$W_{NH}(C) = \frac{\mu}{2}(I_1(C) - 3) - p(J-1)$$

$$\Rightarrow S_{NH} = 2\frac{\partial W_{NH}}{\partial C}\Big|_{J=1} = \mu I - p C^{-1}$$

$$\Rightarrow P_{NH} = F S_{NH} = F(\mu I - p C^{-1})\ldots \quad P_{NH}(F)$$

$$\Rightarrow \sigma_{NH} = \frac{1}{J} F S_{NH} F^T$$

$$= \frac{1}{J}\left(F(\mu I - p C^{-1})F^T\right)$$
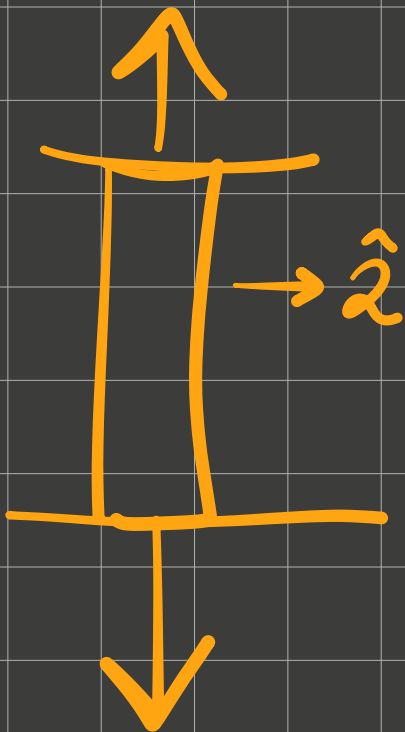
$$\ldots$$

$$\sigma_{NH}(F) = f(FF^T) = f(B)$$

En deformación uniaxial

$$[F] = \begin{bmatrix} \lambda_1 & 0 & 0 \\ 0 & \lambda_2 & 0 \\ 0 & 0 & \lambda_3 \end{bmatrix}$$

incompresible $\Rightarrow |F| = |[F]| = \lambda_1 \lambda_2 \lambda_3 = 1$

Superficie libre $\Rightarrow$ nula tensión

$\rightarrow \hat{2}$

$S_{22} = 0$

$\sigma_{11}(\lambda_1)$

Anisotrópico: Holzapfel

$$W_H(C) = \tilde{W}_H(I_1(C), I_{4f}(C), I_{4s}(C), I_{8fs}(C))$$

Queremos $\dfrac{\partial W_H}{\partial C}$ ... necesitaremos $\dfrac{\partial I_{8fs}}{\partial C}$

$$\frac{\partial I_{8fs}}{\partial C} = \frac{\partial}{\partial C}(f_0 \cdot Cs_0) \equiv \left[\frac{\partial}{\partial C}(f \cdot Cs_0)\right]_{lm} = \frac{\partial}{\partial C_{lm}}(f_0 \cdot Cs_0)$$

$$= \frac{\partial}{\partial C_{lm}}(f_{0i}(Cs_0)_i)$$

$$= \frac{\partial}{\partial C_{lm}}(f_{0i}\, C_{ij}\, s_{0j})$$

$$= f_{0i}\, s_{0j}\, \frac{\partial C_{ij}}{\partial C_{lm}} = f_{0i}\, s_{0j}\, \delta_{il}\, \delta_{jm}$$

$$= f_{0l}\, s_{0m}$$

$$\therefore \left[\frac{\partial I_{8fs}}{\partial C}\right]_{lm} = f_{0l}\, s_{0m} \iff \frac{\partial I_{8fs}}{\partial C} = f_0 \otimes s_0 \quad /\!/$$