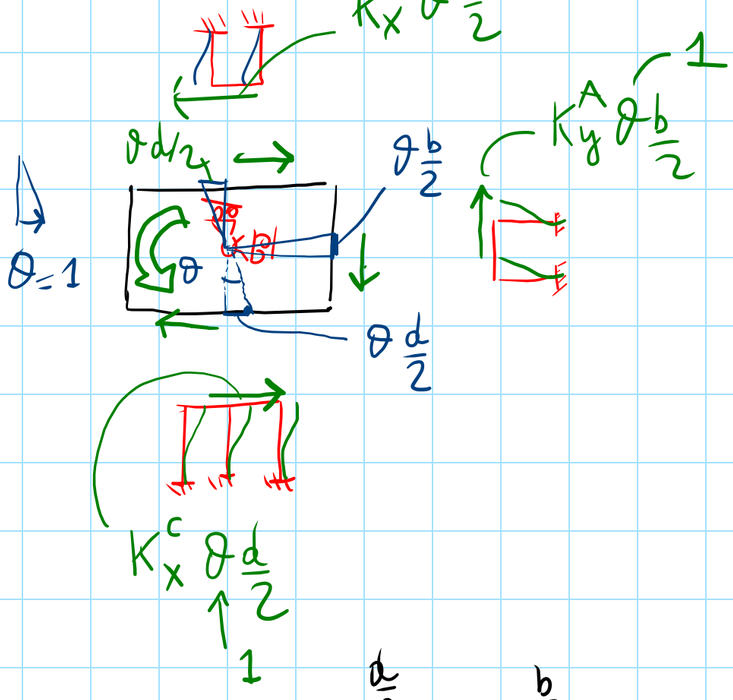
14/5/25

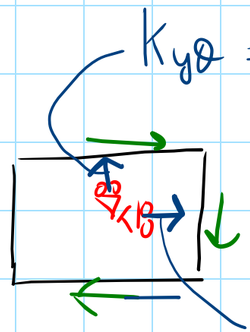
$\theta = 1,\ x = y = 0$



$$K_{\theta\theta} = K_x^C \frac{d}{2}\cdot\frac{d}{2} + K_y^A \frac{b}{2}\cdot\frac{b}{2} + K_x^B \frac{d}{2}\frac{d}{2}$$

$K_{x\theta} =$

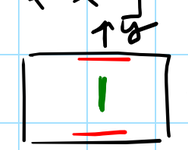
RECALL, SYMMETRY IS DUE TO THE **BETTI'S THEOREM**



1) FRAME B = FRAME C (x: SYMM.)

$$[K] = \begin{bmatrix} x & 0 & 0 \\ 0 & x & x \\ 0 & x & x \end{bmatrix}$$

2)



X, y : AXIS OF SYMMETRY

$$[K] = \begin{bmatrix} K_x^C + K_x^B & 0 & (K_x^C - K_x^B)\frac{d}{2} \\ 0 & K_y^A & K_y^A \frac{b}{2} \\ (K_x^C - K_x^B)\frac{d}{2} & K_y^A \frac{b}{2} & K_{\theta\theta} \end{bmatrix}$$

$$[K] = \begin{bmatrix} x & 0 & 0 \\ 0 & x & 0 \\ 0 & 0 & x \end{bmatrix}$$

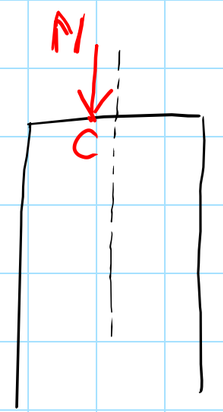
K DIAGONAL

MECHANICS OF MASONRY STRUCTURES (COMPRESSED PILLARS, WALLS, ARCHES)

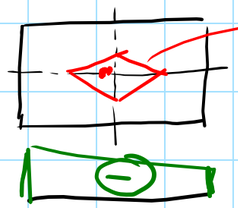
HEYMAN'S HYPOTHESES FOR MODELLING OF MASONRY STRUCTURES

1) MASONRY HAS NO TENSILE RESISTANCE
2) " " INFINITE COMPRESSION RESISTANCE
3) FAILURE OF A STRUCTURE DUE TO SLIDING OF BLOCKS IS RULED OUT
(FRICTION WILL SAVE YOU)

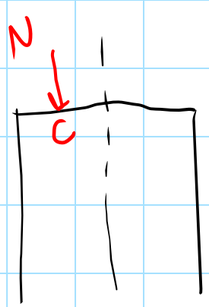
COMPRESSED PILLARS: NO-TENSION MATERIAL

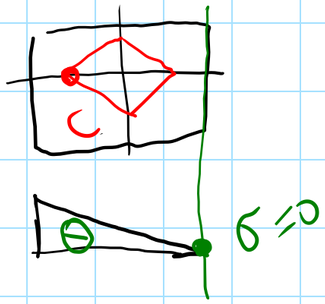


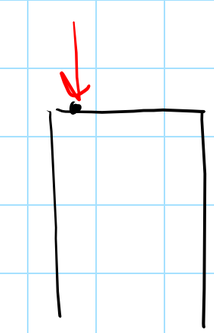
SMALL ECCENTRICITY



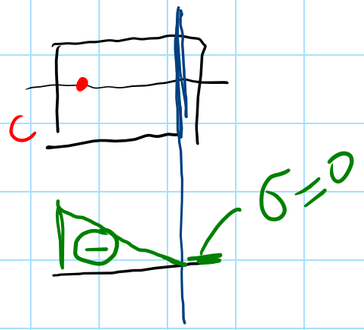
σ ALL SECTION IS COMPRESS.





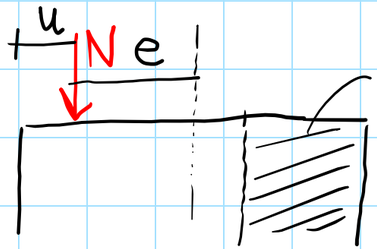


LARGE ECCENTRICITY



NAVIER SOL. NOT VALID !

COMPRESSION OF A NO-TENSION PILLAR LOADED AT "LARGE ECCENTRICITY"

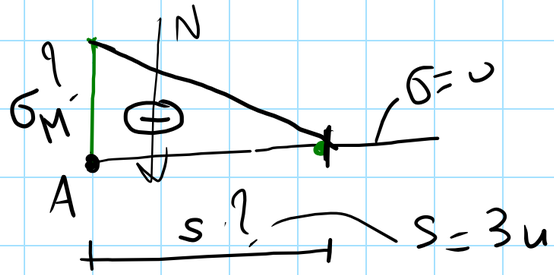


FAILURE / CRACKS /

$$\begin{cases} \sigma_M \, s \, b \frac{1}{2} = N \\ N u = \underbrace{\sigma_M \, s \, b \frac{1}{2}}_{N} \cdot \frac{s}{3} \end{cases} \longrightarrow \sigma_M \, 3u \, b \frac{1}{2} = N \; ; \quad \boxed{\sigma_M = \frac{2N}{3ub}}$$

(EQUIV. MOM W.R.T. A)

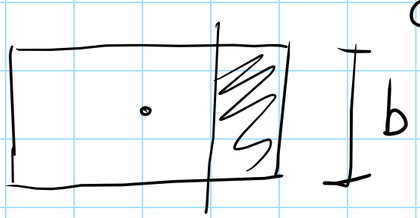
$$\longrightarrow u = \frac{s}{3}$$



BY IMPOSING EQUIVALENCE OF FORCES AND MOMENTS

$\Rightarrow \sigma_M, s$

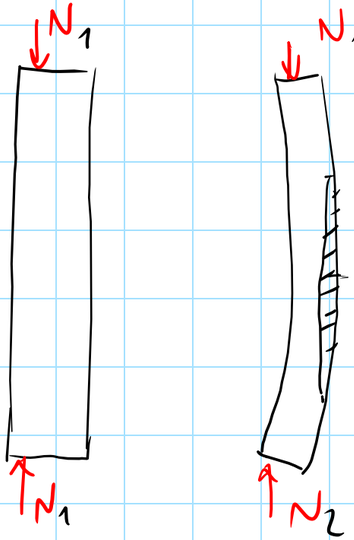
CROSS SECTION



WHAT IF MASONRY HAS GOT A LIMITED RESISTANCE IN COMPRESSION? f_k : MAX STRESS IN COMPRESSION

$u \rightarrow u_{MIN}$! $u_{MIN} = \frac{2N}{3b f_k}$

INSTABILITY OF A PILLAR LOAD AT "LARGE ECCENTRICITY"



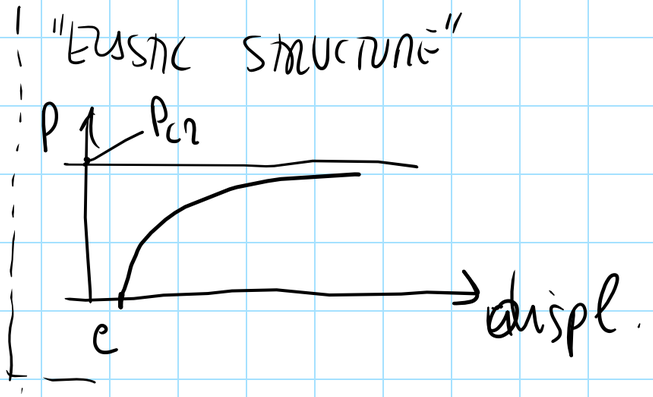
AT WHICH N_1 DOES THE PILLAR BECOME UNSTABLE ? (FAILURE!)

???

YOKEL
SALIN
FRISCH FAY

60s
70s

"ELASTIC STRUCTURE"



DEVELOP A "ELASTIC LINE" APPROACH AND STUDY PROGRESSIVE INSTABILITY.