

Esercizio: statica del corpo rigido

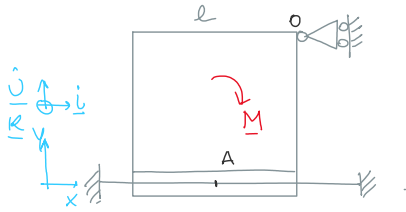
giovedì 24 ottobre 2024 17:48

Nota : $M = 500 \text{ Nm}$

$l = 0.5 \text{ m}$

Trovare : 1) Reaz. Vincolari

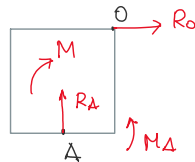
2) A.C. della CP



•) AGV : $n^{\circ} gde = 3 - 1 - 2 = 0 gde$

•) AFV : $\left(O, R_O \underline{i} \right) \Rightarrow 1 \text{ INC.}$
 $\left(A, R_{CP} \underline{j} \right), M_{CP} \Rightarrow 2 \text{ INC.}$
 $\left. \begin{matrix} \Rightarrow 3 \text{ INCOG.} + 3 \text{ EQNI} \\ (R_O, R_{CP}, M_{CP}) \end{matrix} \right\} \Rightarrow 3 \text{ INCOG.} + 3 \text{ EQNI}$
 PROB. ISOSTAT.

•) DCL P.

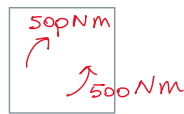


I CS. $\left\{ \begin{matrix} R_A + R_O = 0 \\ A \uparrow M + M_A + \vec{AO} \wedge \underline{R}_O = 0 \end{matrix} \right.$

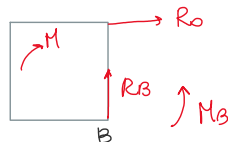
X: $\left\{ \begin{matrix} R_O = 0 \\ Y: R_A = 0 \\ A \uparrow -M + M_A - R_O l = 0 \end{matrix} \right.$

$M_A = M = 500 \text{ Nm}$

•) DCL P



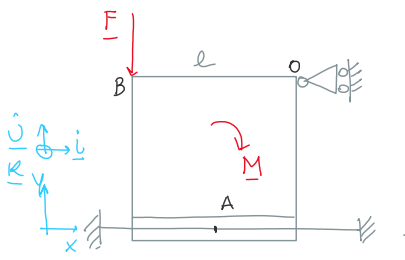
OSSERVAZIONI



1) Se al posto di A, consideriamo B
 cosa cambia?

NO
 $M_A = M_B = M$ (INDIPEND. POLO)
 \Downarrow
 COPPIA

2) ∇ AC. perché $R_A = 0$



$F = 1000 \text{ N}$

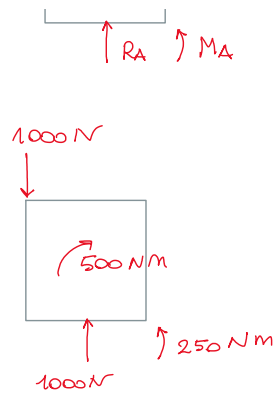
(B, E)

•) DCL PRELIMIN.



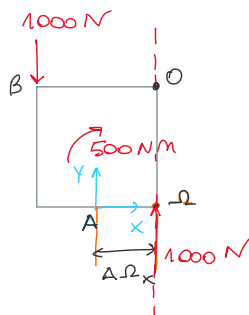
X: $\left\{ \begin{matrix} R_O = 0 \\ Y: -F + R_A = 0 \\ A \uparrow F \frac{l}{2} - R_O l + M_A - M = 0 \end{matrix} \right.$

•) DCL DEFIN



$$\begin{cases} R_0 = 0 \text{ N} \\ R_A = F = 1000 \text{ N} \\ M_A = M - F\frac{l}{2} = 250 \text{ Nm} \end{cases}$$

⇒ Valutiamo AC. coppia prismatica:



$$\underline{M}_O = 0 = \underline{M}_A + \underline{r}_{A \rightarrow O} \wedge \underline{R}$$

$$\underline{r}_{A \rightarrow O} \wedge \underline{R} = \underline{M}_A$$

$$\begin{vmatrix} \underline{i} & \underline{j} & \underline{k} \\ A\Omega_x & A\Omega_y & 0 \\ 0 & R_A & 0 \end{vmatrix} = M_A \underline{k}$$

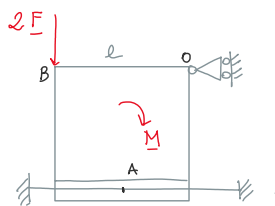
$$R_A A\Omega_x \underline{k} = M_A \underline{k}$$

$$\Rightarrow A\Omega_x = \frac{M_A}{R_A} = \frac{M - F\frac{l}{2}}{F} = \frac{l}{2} = 0.25 \text{ m}$$

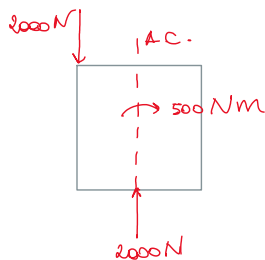
⇒ (B, 2F)

cosa cambia se F raddoppia? Rimane valido DCL FESL + EPNI

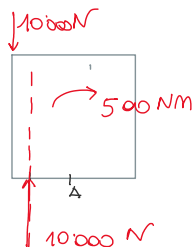
$$F \rightarrow 2F$$



$$\begin{cases} R_0 = 0 \text{ N} \\ R_A = 2F = 2000 \text{ N} \\ M_A = M - 2F\frac{l}{2} = 0 \text{ Nm} \Rightarrow \text{AC. PASSA FESL} \end{cases}$$

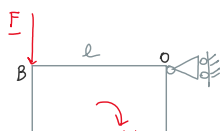


⇒ (B, 10F)

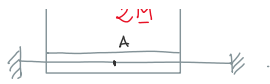


$$A\Omega_x = -0.2 \text{ m}$$

⇒ (B, F), 2M

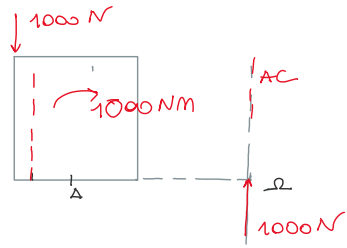


$$\begin{cases} R_0 = 0 \text{ N} \\ R_A - F = 1000 \text{ N} \\ M_A = 2M - F\frac{l}{2} = 750 \text{ Nm} \end{cases}$$

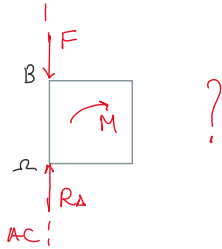


2

$$A_{Rx} = \frac{M_A}{R_A} = \frac{2M - Fl/2}{F} = 0,75 \text{ m}$$



⇒ Puro' accadere R già "in linea" con B



$$A_{Rx} = \frac{M - Fl/2}{F} = -\frac{l}{2}$$

$$M - F\frac{l}{2} = -F\frac{l}{2}$$

$$M = 0$$