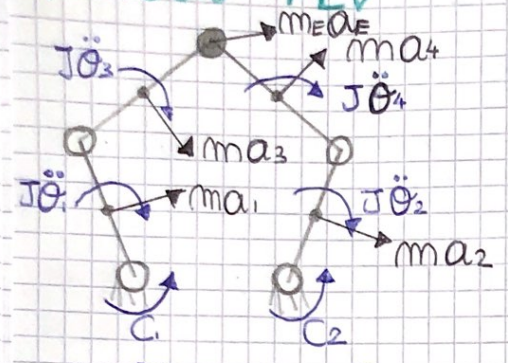
Metodo PLV



$C_1 \delta\theta_1 + C_2 \delta\theta_2 - J\ddot{\theta}_1 \delta\theta_1 - ma_1 \delta G_1 - J\ddot{\theta}_2 \delta\theta_2 +$
$- ma_2 \delta G_2 - J\ddot{\theta}_3 \delta\theta_3 - ma_3 \delta G_3 - J\ddot{\theta}_4 \delta\theta_4 +$
$- ma_4 \delta G_4 - m_E a_E \delta E = 0$

Posso esprimere gli spostamenti infinitesimi come

$\delta G_1 = \frac{l}{2} \delta\theta_1$, $\delta G_2 = \frac{l}{2} \delta\theta_2$

$\delta G_3 = l \delta\theta_1 + \frac{l}{2} \delta\theta_3$, $\delta G_4 = l\delta\theta_2 + \frac{l}{2} \delta\theta_4$

$\delta E = l \delta\theta_1 + l \delta\theta_3$

$\dot{\theta}_3 = \frac{d\theta_3}{dt} = J_{34\,11} \frac{d\theta_1}{dt} + J_{34\,12} \frac{d\theta_2}{dt}$

$\rightarrow \delta\theta_3 = J_{11} \delta\theta_1 + J_{12} \delta\theta_2$

$\rightarrow \delta\theta_4 = J_{21} \delta\theta_1 + J_{22} \delta\theta_2$

Riscrivo la relazione

$C_1 \delta\theta_1 + C_2 \delta\theta_2 - J\ddot{\theta}_1 \delta\theta_1 - ma_1 \frac{l}{2} \delta\theta_1 - J\ddot{\theta}_2 \delta\theta_2 +$
$- ma_2 \frac{l}{2} \delta\theta_2 - J\ddot{\theta}_3 (J_{11} \delta\theta_1 + J_{12} \delta\theta_2) - ma_3 (l \delta\theta_1$
$+ \frac{l}{2} (J_{11} \delta\theta_1 + J_{12} \delta\theta_2)) - J\ddot{\theta}_4 (J_{21} \delta\theta_1 + J_{22} \delta\theta_2) +$
$- ma_4 (l \delta\theta_2 + \frac{l}{2} (J_{21} \delta\theta_1 + J_{22} \delta\theta_2)) +$
$- m_E a_E (l \delta\theta_1 + l (J_{11} \delta\theta_1 + J_{12} \delta\theta_2)) = 0$

CASO $\delta\theta_1 \neq 0$ $\delta\theta_2 = 0$

$C_1 - J\ddot{\theta}_1 - ma_1 \frac{l}{2} - J\ddot{\theta}_3 J_{11} - ma_3 (l + \frac{l}{2} J_{11}) +$
$- J\ddot{\theta}_4 J_{21} - ma_4 \frac{l}{2} J_{21} - m_E a_E (l + l J_{11}) = 0$

Caso $\delta\theta \neq 0$ $\delta\theta_2 = 0$

$C_2 - J\ddot{\theta}_2 - ma_2 \frac{l}{2} - J\ddot{\theta}_3 J_{12} - ma_3 \frac{l}{2} J_{12} +$
$- J\ddot{\theta}_4 J_{22} - ma_4 (l + \frac{l}{2} J_{22}) - m_E a_E l J_{12} = 0$

$a_1 = \frac{l}{2} \ddot{\theta}_1$ $a_2 = \frac{l}{2} \ddot{\theta}_2$

? = a_3, a_4, a_E