Taller #1 Corte 2

①

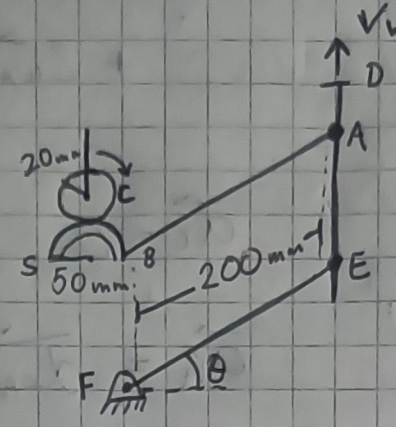
$\uparrow V_W = 40\,mm/s$

$V_m = ?\ rpm$

$\omega_{AB} = ?$

$\omega_{EF} = ?$

$\theta = 15°$



$V_A = V_E$

$\omega_s \cdot r_a = V_A = V_E$

$V_c = \omega_c r_c$

$\omega_s = \frac{V_c}{r_s}$

$V_W = V_A \cos\theta$

$40mm/s = V_A \cos 15° \rightarrow \boxed{V_a = 41,41\,mm/s = V_E}$

$41,41mm/s = \omega_s \cdot 200mm \rightarrow \underline{\omega_s = 0,207\,rad/s}$

$0,207\,rad/s = \frac{V_m}{50mm} \rightarrow \underline{V_m = \uparrow 10\,mm/s}$

$10mm/s = \omega_c \cdot 20mm \Rightarrow \underline{\omega_c = 0,5\,rad/s}$

$\frac{0,5\,rad}{s} \cdot \frac{60s}{1\,min} \cdot \frac{1\,rev}{2\pi \cdot rad} = \boxed{4,774\,rpm}$

$\omega_{AB} = \omega_{EF} = \frac{V_A}{r_{AB}} = \frac{V_E}{r_{EF}} = \boxed{0,207\,rad/s}$

$Co/h = S \quad Co/Ca = T$

$Ca/h = C$

$\frac{Co}{Ca} = T \rightarrow Ca = \frac{Co}{T}$

②

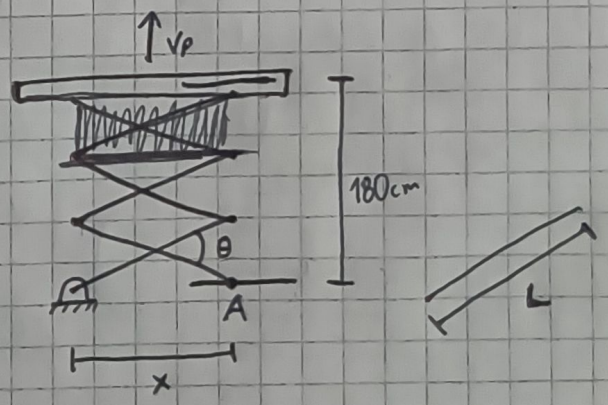
$\leftarrow V_A = 5\,cm/s \qquad H_{max} = 180cm$

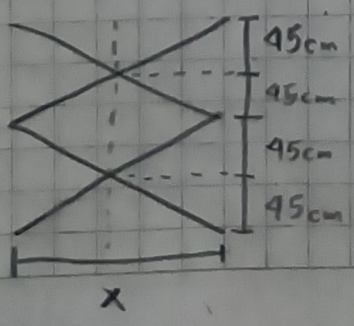
$V_p = ? \qquad L = ?$

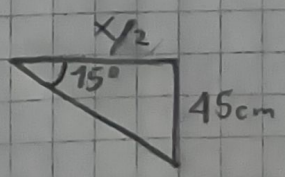
$\theta_1 = 0° ; \theta_2 = 30° \qquad X = ?$

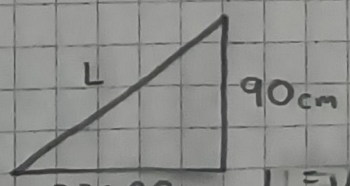
$0° = 0cm = x_{max} = 93,17cm$

$30° = 180cm = x_{min} = 24,11cm$









$L = \sqrt{335,88^2 + 90^2}$

$\boxed{L = 347,73cm}$

$X/2 = \frac{45}{Tan\,15} = 167,94cm$

$\boxed{X = 335,88cm}$

$X_0 = 0cm$ $\quad V_x = 5cm/s$

$X_f = 11,85cm$

$Y_0 = 0cm$ $\quad V_y = ?$

$Y_f = 180cm$

$1cm_x = 2,60cm_y$

$X_f = X_0 + V_x \cdot t$

$t = \frac{X_f - X_0}{V_x} = \frac{11,85cm}{5cm/s} = 2,37\ s$

$Y_F = Y_0 + V_y \cdot t$

$V_y = \frac{Y_F - Y_0}{t} = \frac{180cm}{2,37s} = 75,94cm/s$

Esta es la velocidad inicial de la plataforma, ya que esta se desacelera hasta una $V = 0cm/s$

$\boxed{V_{P_0} = 75,94\ cm/s}$

③

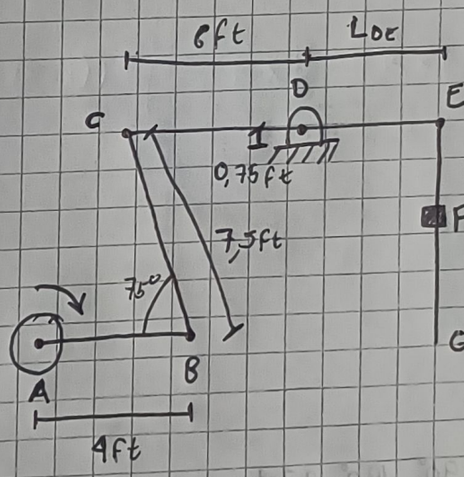
$\omega_{AB} = 15 rad/s$

$V_F = 50ft/s$

$\omega_{BC} = ?$

$\omega_{CDE} = ?$

$L_{DE} = ?$



$V_E = V_D + V_{E/D}$

$V_E = \omega_{DCE} \times r_{E/D}$

$V_E = 10,346 rad/s\ \hat{k} \cdot L_{DE}$

$L_{DE} = \frac{50 ft/s}{10,346 rad/s} =$

$\boxed{L_{DE} = 4,83 ft}$

$V_B = V_A + V_{B/A}$

$V_A = 0$

$V_B = \omega_{AB} \times r_{B/A} = \ominus 15\hat{k} \times 4\hat{i} = \underline{-60 ft/s\ \hat{j}}$

$V_C = V_B + V_{C/B}$

$V_C = -60\hat{j} + \omega_{BC} \times r_{C/B} = -60\hat{j} + \omega_{BC}\hat{k} \times (7,5\cos 75°\hat{i} + 7,5 sen 75°\hat{j})$

$V_C = -7,244\,\omega_{BC}\hat{i} - (60 + 1,941\omega_{BC})\hat{j}$ ①

$V_C = V_D + V_{C/D}$

$V_D = 0$

$V_C = \omega_{DC} \times r_{C/D} = \omega_{DC}\hat{k} \times (-6\hat{i} + 0,75\hat{j}) = -0,75\,\omega_{DC}\hat{i} - 6\,\omega_{DC}\hat{j}$ ②

$-0,75\,\omega_{DC}\hat{i} - 6\,\omega_{DC}\hat{j} = -7,244\,\omega_{BC}\hat{i} - (60 + 1,941\omega_{BC})\hat{j}$

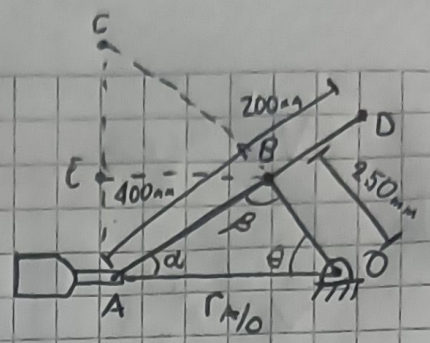
$\boxed{\omega_{BC} = 1,072 rad/s\ \hat{k}}$ $\quad \boxed{\omega_{DC} = 10,346 rad/s\ \hat{k}}$

④ → $V_A = 5\,m/s$; $\theta = 50°$

$V_D = ?$ $\quad \beta = (250mm)/\left(\frac{400mm}{Sen\,50°}\right)$

$W_{ABD} = ?$ $\quad \beta = 28,6°$

$\alpha = 180° - 28,6° - 50° = 101,4°$



$r_{A/O} = 400\,Cos\beta + 250\,Cos\,\theta = \underline{511,89\,mm}$

$r_{A/C} = Tan\,\theta \cdot r_{A/O} = 610,04\,mm$

$r_{E/O} = 600mm \cdot Cos\beta = 526,789\,mm$

$r_{E/C} = r_{A/C} - (600\,Sen\beta) = 322,831\,mm$

$r_{C/O} = \sqrt{r_{C/E}^2 + r_{E/O}^2} = 617,841\,mm$

$W_{ABD} = \frac{V_D}{r_{C/O}}$ $\qquad W_{ABD} = \frac{V_A}{r_{A/C}}$ $\qquad V_D = \frac{V_A}{r_{A/C}} \cdot r_{C/D}$

$= 5\,m/s \cdot \frac{617,841\,mm}{610,04\,mm}$

$V_D = 5,0638\,m/s$

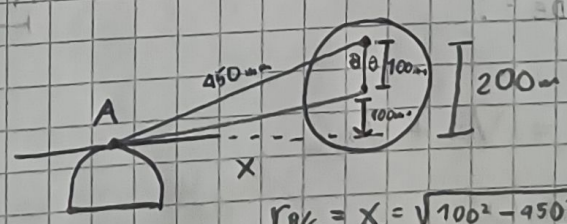
$W_{ABD} = \frac{V_A}{r_{A/C}} = \frac{5\,m/s}{0,61\,m} = \boxed{8,196\,rad/s}$

⑤

↻ $V_m = 100\,rpm$

$a_A = ?$; $\theta = 0°, 90°, 180°, 270°$

$a_{AB} = ?$ $\theta = Same.$



$\frac{100\,rev}{1\,min} \cdot \frac{1\,min}{60s} \cdot \frac{2\pi\,rad}{1\,rev} = 10,47\,rad/s$

$r_{B/C} = X_1 = \sqrt{100^2 - 450^2} = 438,74$

$r_{B/C} = X_2 = \sqrt{200^2 - 450^2} = 403,11$

$a_A = a_B + a_{A/B}$

$a_A = [W_m \times (W_m \times r_{B/O})] + [W_{AB} \times (W_{AB} \times r_{A/B}) + a_{A/B} \times r_{A/B}]$

$W_{A/B} = \frac{V_B}{r_{B/C}} = \frac{W_m \times r_{B/O}[m]}{r_{B/C}[m]} = \frac{10,47 \times 100}{438,74} = \underline{-2,386\,rad/s} \rightarrow 90°\ y\ 270°$

$\frac{10,47 \times 100}{403,11} = \underline{-2,597\,rad/s} \rightarrow 0°$

$\frac{10,47 \times 100}{450} = \underline{-2,327\,rad/s} \rightarrow 180°$

$a_A \hat{i} = [(10,47 rad/s)\hat{k} \times (10,47 rad/s \hat{k} \times -0,1m \hat{i})] + (-2,38 rad/s)\hat{k} \times [(-2,38 rad/s)\hat{k} \times (-0,1\hat{j} - 0,438\hat{i})] + \ldots$

$(-2,59)$ $(-2,32)$ $(-2,59)$ $(-2,32)$ $(0,403)$ $(0,45)$

$\ldots \alpha_{AB}\hat{k} \times (-0,1m\hat{j} - 0,438\hat{i})$

$(0,403)$ $(0,45)$

$0 = 0,569 m/s^2 \hat{j} - (0,438m \times \alpha_{AB})\hat{j}$

$\boxed{\alpha_{AB} = 1,298 rad/s^2}$ $90°; 270°$

$a_A = 10,966 m/s^2 \hat{i} + 2,5 m/s^2 \hat{i} + (0,1m \times \alpha_{AB})\hat{i}$

$\boxed{a_A = 13,596 m/s^2}$ $90°; 270°$

$0 = 1,349 m/s^2 \hat{j} - (2,72 m/s^2 \times \alpha_{AB})\hat{j}$

$\boxed{\alpha_{AB} = 3,348 rad/s}$ $0°$

$a_A = 10,966 m/s^2 \hat{i} + 2,72 m/s^2 \hat{i} + (0,2m \times \alpha_{AB})\hat{i}$

$\boxed{a_A = 14,355 m/s^2}$ $0°$

$0 = 0 - 0,45 m/s^2 \times \alpha_{AB}$

$\boxed{\alpha_{AB} = 0 rad/s^2}$ $180°$

$a_A = 10,966 m/s^2 \hat{i} + 2,4369 m/s^2 \hat{i}$

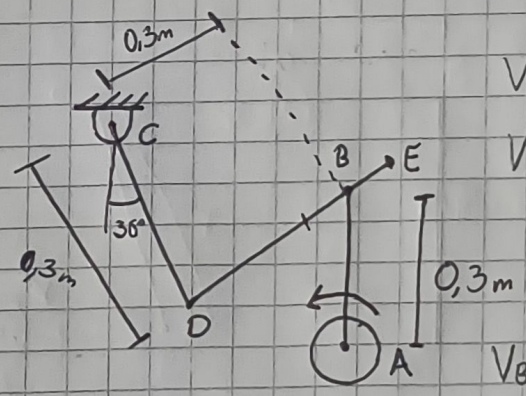
$\boxed{a_A = 13,403 m/s^2}$ $180°$

⑥ $\omega_{CDE} = ?$

$\alpha_{CDE} = ?$

$\omega_{AB} = 10 rad/s$

$\alpha_{AB} = 5 rad/s^2$



$V_B = V_A + V_{B/A}$

$V_A = 0$

$V_B = \omega_{AB} \times r_{AB}$

$V_B = 10 rad/s \hat{k} \times 0,3m\hat{j}$

$\underline{V_B = -3 m/s \hat{i}}$

$r_B = r_C + r_{B/C}$

$r_C = 0$

$r_B = (0,3 Sen 30° + 0,3 Cos 30°)\hat{i} + (0,3 Cos 30° - 0,3 Sen 30°)\hat{j}$

$r_B = (0,409m\hat{i} - 0,109m\hat{j}) = r_{B/C}$

$V_B = V_C + V_{B/C}$

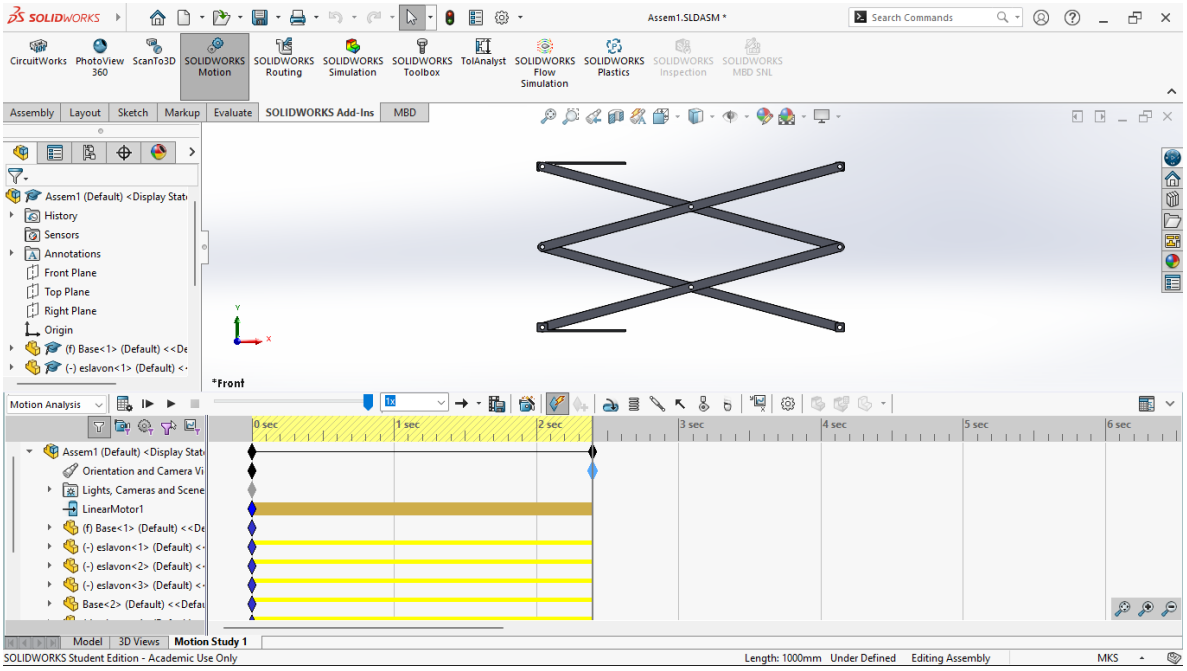
$V_C = 0$

$V_B = \omega_{B/C}\hat{k} \times r_{B/C} - (V Sen 30°)\hat{j} - (V Cos 30°)\hat{i}$

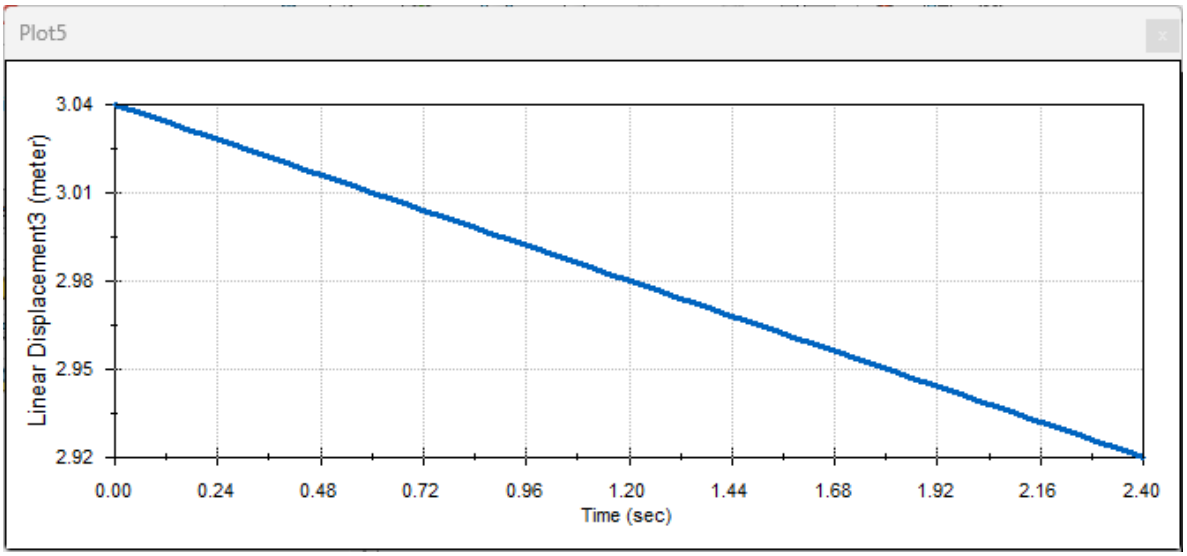
$-3 m/s\hat{i} = [0,409m\hat{j}\,\omega_{BC} - V Sen 30° \omega_{BC}\hat{j}] + [0,109\,\omega_{BC}\hat{i} - V Cos 30° \omega_{BC}\hat{i}]$

$\boxed{\omega_{BC} = 5,011 m/s^2}$

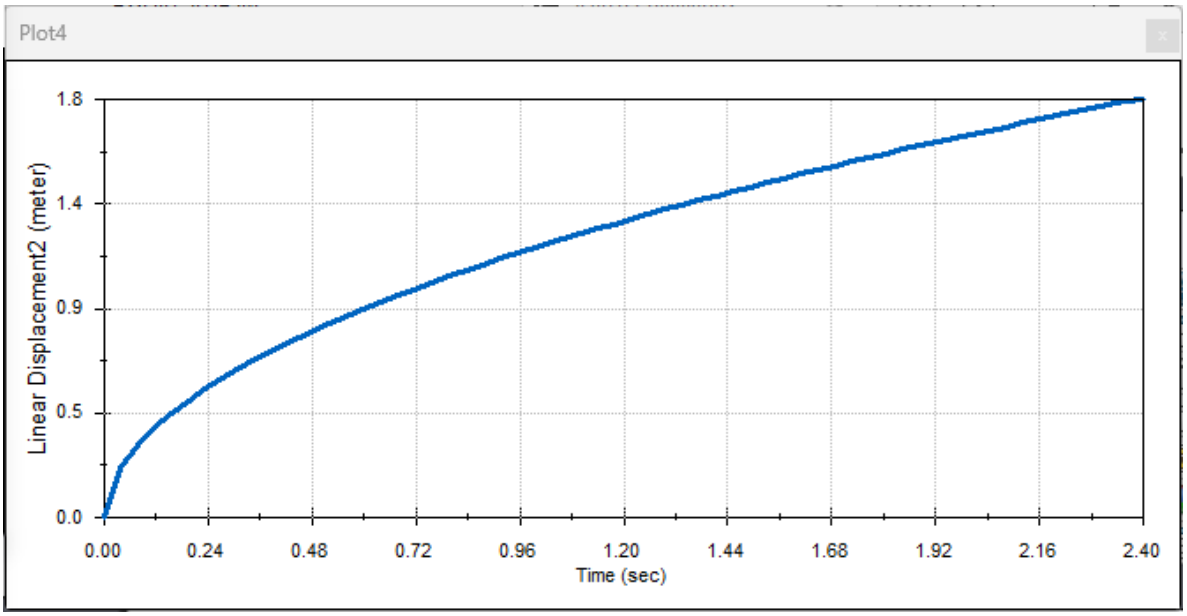
Simulación punto 2



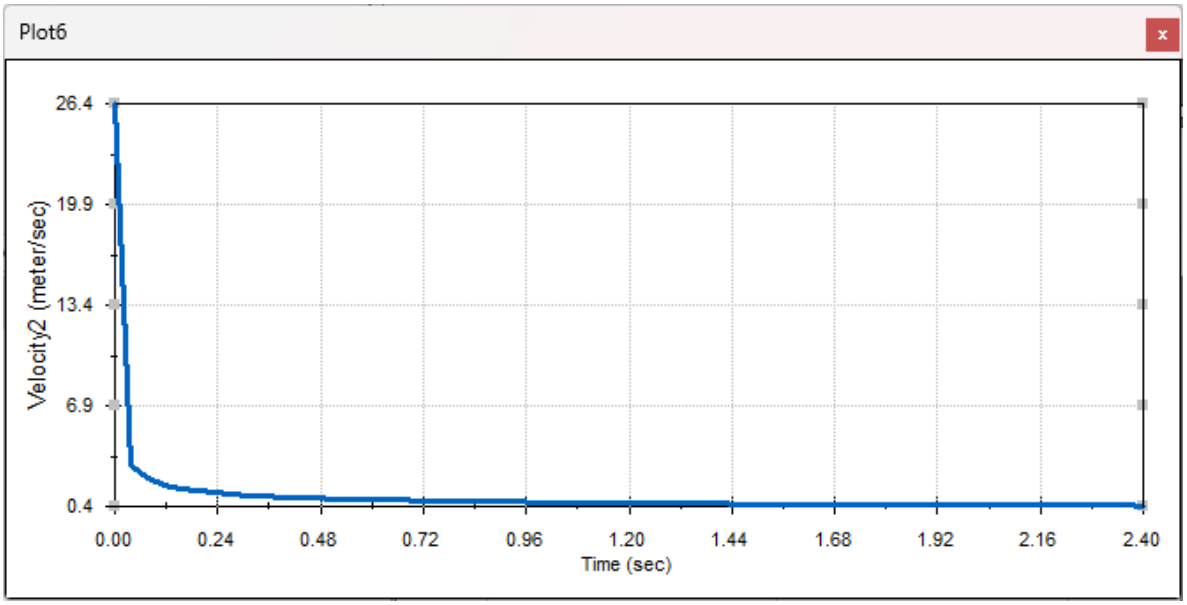
Desplazamiento X



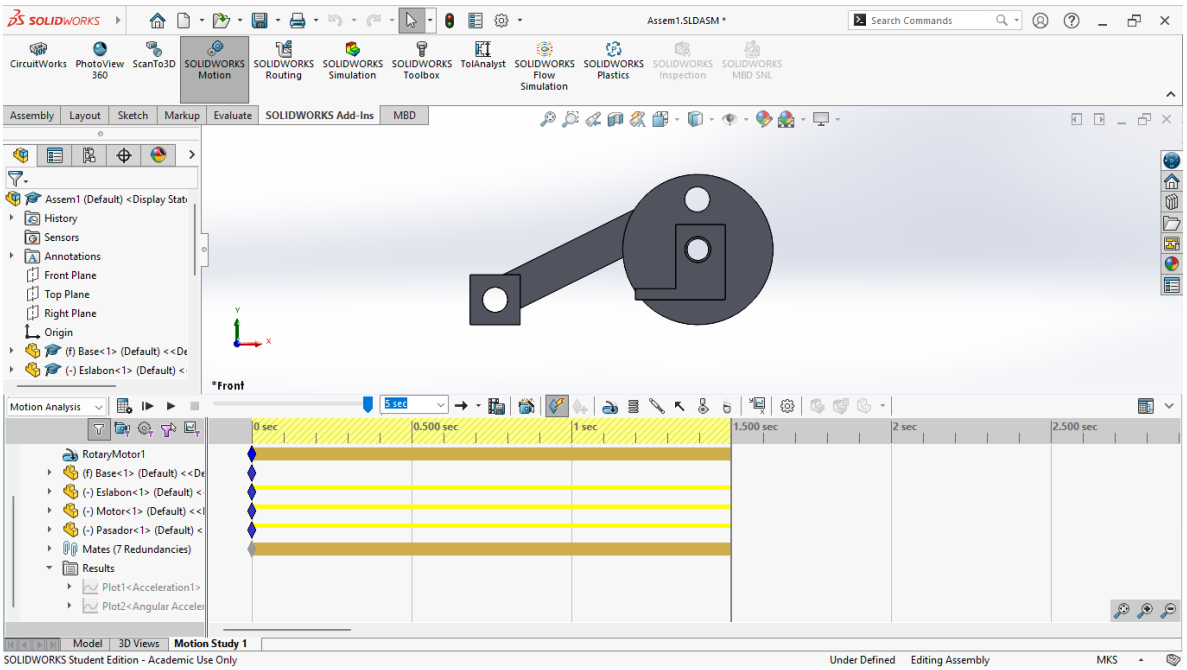
Desplazamiento Y



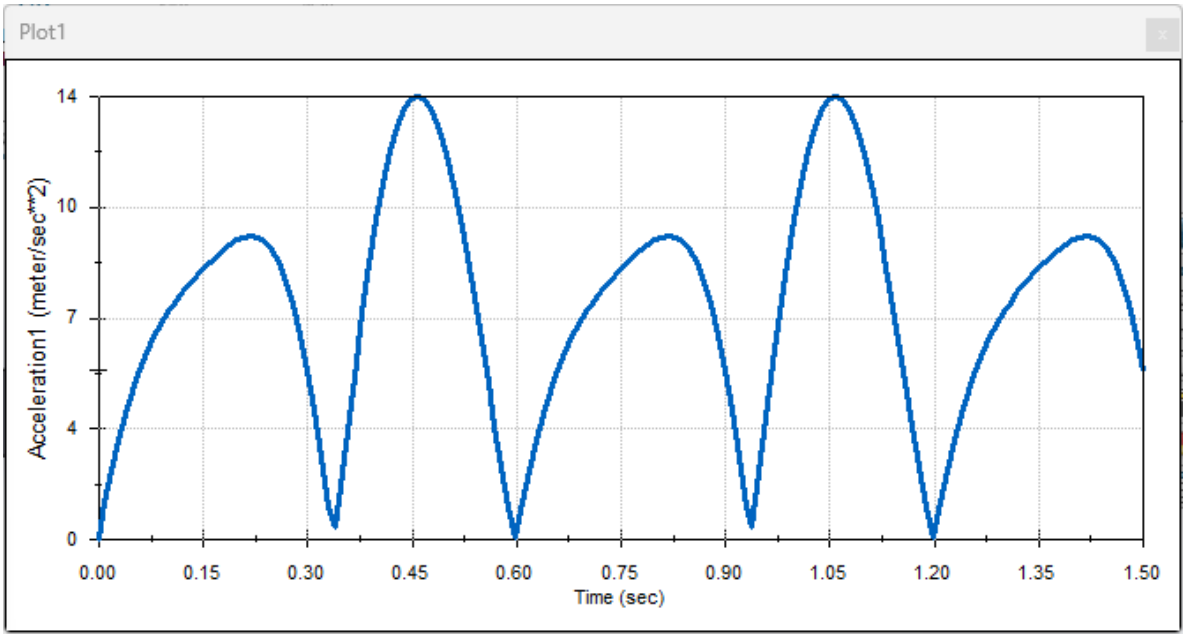
Grafica de velocidad de la plataforma



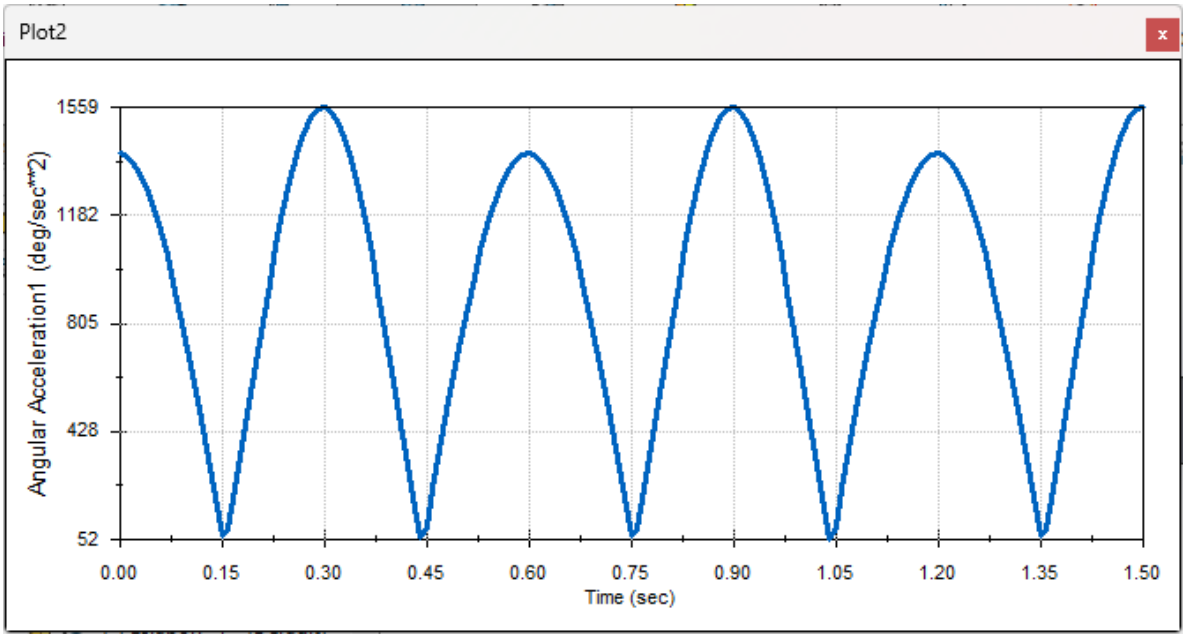
Simulación punto 5



Aceleración pasador



Aceleración angular AB


Plot2
1559
1182
805
428
52
Angular Acceleration1 (deg/sec**2)
0.00
0.15
0.30
0.45
0.60
0.75
0.90
1.05
1.20
1.35
1.50
Time (sec)