Robot Control

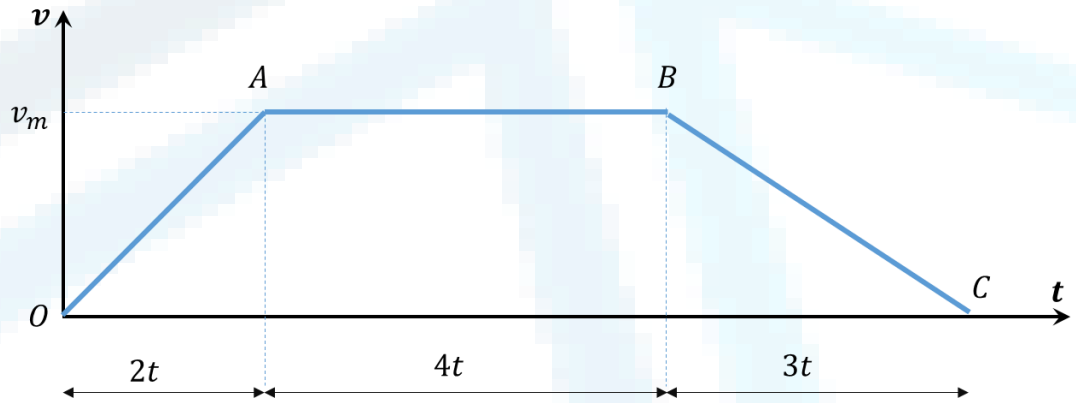
Velocity of an axis

Exercises

Test1 22-23 semester 1

Given the velocity profile in the figure beside,

1. Derive the formula for $\boldsymbol{v_m}$ as a function of $\boldsymbol{t}$ and $\boldsymbol{S_C}$
2. Deduct the formula of the acceleration and the deceleration (as functions of $\boldsymbol{t}$ and $\boldsymbol{S_C}$)



Solution

$$S_c = v_m \times \frac{2t}{2} + v_m \times 4t + v_m \times \frac{3t}{2}$$

$$\Rightarrow v_m = \frac{2}{13t} \times S_c$$

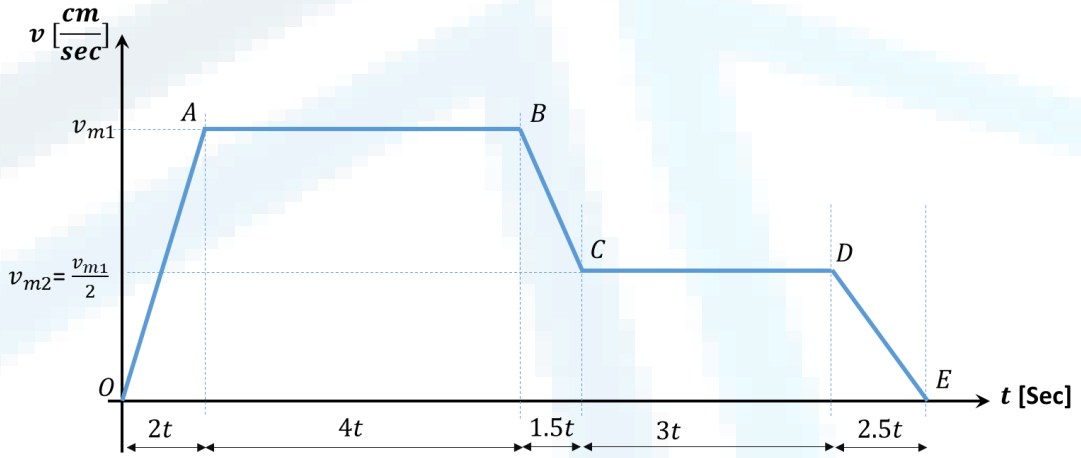
$$a_c = \frac{v_m}{2t} = \frac{1}{13t^2} \times S_c$$

$$a_d = \frac{-v_m}{3t} = \frac{-2}{39t^2} \times S_c$$

Final 2021 semester 2

Given the trapezoidal velocity profile of a motor,

1) Find the velocity v_{m1} as a function of the distance traveled at point C, and time t.
2) Deduct the acceleration and the decelerations.



Solution

$$S_C = 6.125 \times t * v_{m1} \Rightarrow v_{m1} = \frac{S_C}{6.125 \times t}$$

$$A_{a1} = \frac{v_{m1}}{2t} = \frac{S_C}{12.25 \times t^2}$$

$$A_{d1} = \frac{(v_{m2} - v_{m1})}{1.5t} = \frac{-v_{m1}}{3t} = -\frac{S_C}{18.375 \times t^2}$$

$$A_{d2} = \frac{-v_{m2}}{2.5t} = \frac{-v_{m1}}{5t} = -\frac{S_C}{30.625 \times t^2}$$

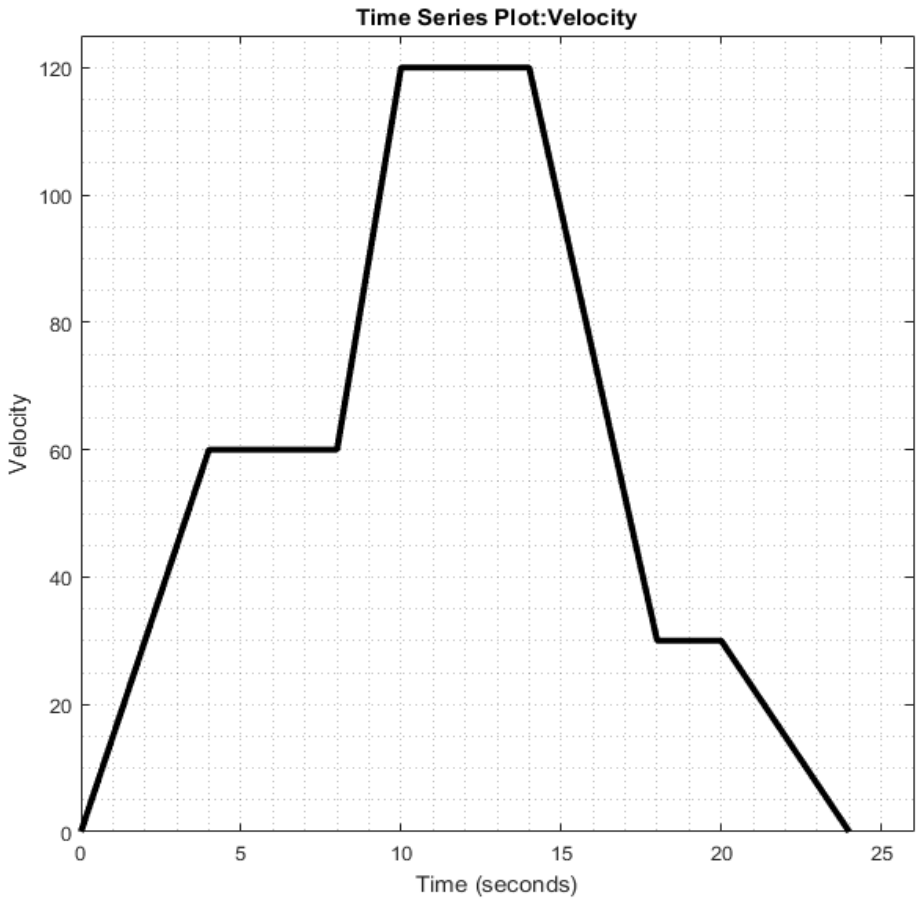
Exercise

Given the trapezoidal velocity profile of a motor, (velocity in CTS/sec)

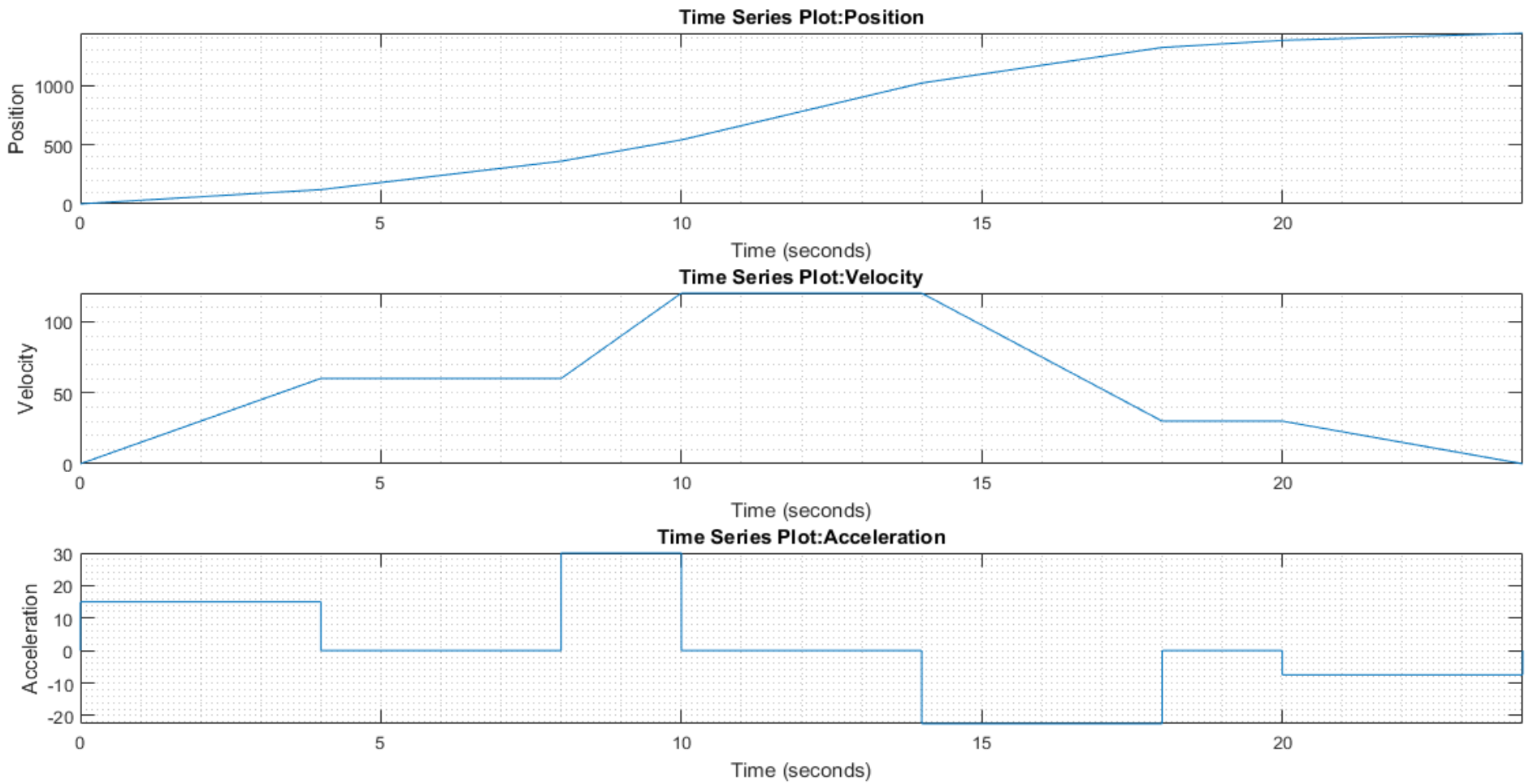
Plot the position and acceleration profiles.

Note:

The points are (0 A B C D E F S)



	Pos	Acc
O	0	0
A	120	15
B	360	0
C	540	30
D	1020	0
E	1320	-22.5
F	1380	0
S	1440	-7.5



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Thanks