Answer on Question #84756- Physics - Mechanics/Relativity

Question: *During a certain period of time, the angular position of swinging door is described by*

O=5.00+10.0t+2.00t^2

Where O is in rad and t is in second.

Determine the angular position, the angular speed and the angular acceleration of the door

a) at t=0

b)at t=3.00s

Answer:

By definition, angular velocity ω and angular acceleration α are defined as:

$$\omega = \frac{d\theta}{dt}, \quad \alpha = \frac{d\omega}{dt}. \tag{1}$$

Calculating the derivatives explicitly, one can obtain:

$$\omega = 10 + 4t, \quad \alpha = 4. \tag{2}$$

Substituting numerical values, we get:

$$\begin{aligned}
\theta(0) &= 5rad, \quad \theta(3s) = 53rad \\
\omega(0) &= 10rad / s, \quad \omega(3s) = 22rad / s. \\
\alpha(0) &= \alpha(3s) = 4rad / s^2
\end{aligned} \tag{3}$$

Answer provided by