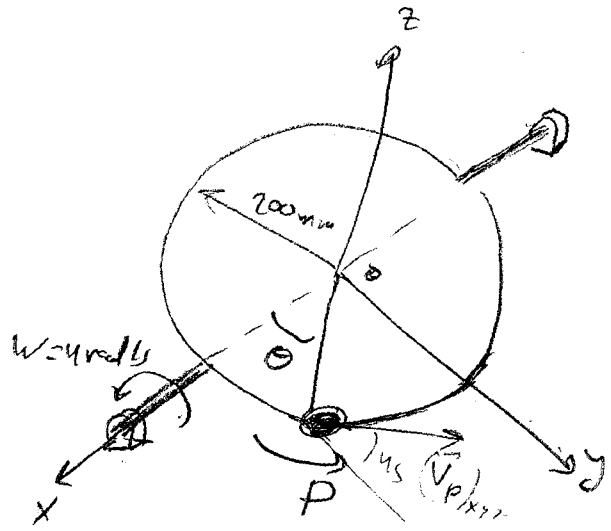
20-43



$\theta = 45$

$\dot{\theta} = 6$ rad/s = constant.

$\omega = 4$ rad/s = const

$\vec{V}_P$; $\vec{a}_P$

$\vec{\omega} = 4\vec{i}$

$\vec{\alpha} = \dot{\vec{\omega}} = 4\vec{i}$

$(\vec{V}_P)_{xyz} = \dot{\theta} r [-\sin(45)\,i + \cos(45)\,j]$

$= (-0.8485\,i + 0.8485\,j)$ m/s.

$\vec{V}_P = \vec{V}_O + \vec{\omega} \times \vec{r}_{P/O} + (\vec{V}_{P/O})_{xyz}$

$= 0 + 4\vec{i} \times (\cos 45\,i + \sin 45\,j) + (-.8485\,i + 0.8485\,j)$

$= (-0.8485\,i + 0.8485\,j + 0.5657\,k)$ m/s.

$\vec{a}_P = \vec{a}_O + \dot{\vec{\omega}} \times \vec{r}_{P/O} + \vec{\omega} \times (\vec{\omega} \times \vec{r}_{P/O}) + (\vec{a}_{P/O})_{xyz} + 2\vec{\omega} \times (\vec{V}_{P/O})_{xyz}$

$(\vec{a}_{P/O})_{xyz} = \underbrace{(\vec{a}_{P/O})_{xyz}}_{\text{constant}} + (\vec{a}_{P/O})^{n}_{xyz} = 0 + \dot{\theta}^2 r [-0.8485\,i - 0.8485\,j]$.

$= -5.091\,i - 5.091\,j$.

$= 0 + 0 + (4\vec{i} \times 0.5657\,k) + (-5.091\,i - 5.091\,j) + 2(4\vec{i} \times (-0.8485\,i - 0.8485\,j))$

$= (-5.091\,i - 7.354\,j + 6.788\,k)$ m/s²