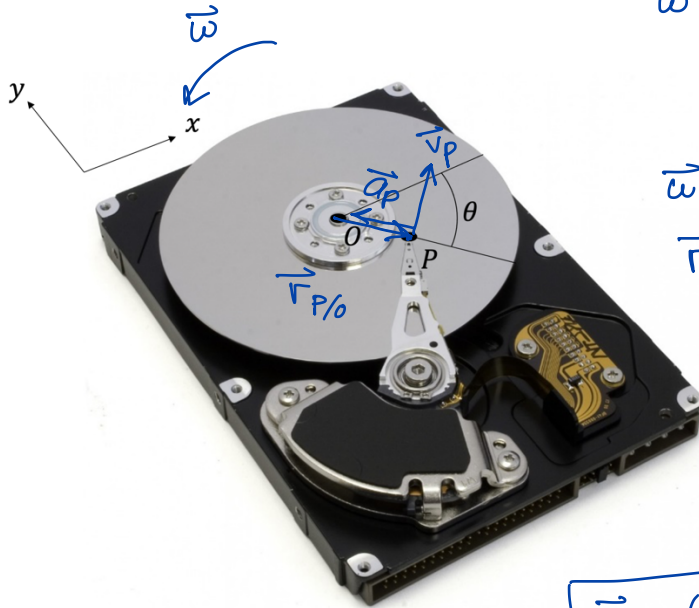


An 8 cm diameter hard drive platter is rotating at a constant rate of 3600 rpm counterclockwise. What are the velocity and acceleration of a point,  $P$ , under the read/write head? The head is 1.5 cm from the platter axis, and located at an angle of 45 degrees from the horizontal.



$$\omega = 3600 \frac{\text{rot}}{\text{min}} \cdot \frac{1 \text{ min}}{60 \text{ sec}} \cdot \frac{2\pi \text{ rad}}{1 \text{ rot}}$$

$$= 376.8 \text{ rad/s}$$

$$\vec{\omega} = 376.8 \text{ rad/s } \hat{k}$$

$$\vec{r}_{P/O} = 0.015 (\cos 45^\circ \hat{i} - \sin 45^\circ \hat{j}) \text{ m}$$

$$\vec{v}_P = \vec{\omega} \times \vec{r}_{P/O}$$

$$= 376.8 \text{ rad/s } \hat{k} \times (0.015 \cos 45^\circ \hat{i} - 0.015 \sin 45^\circ \hat{j}) \text{ m}$$

$$\times (0.015 \cos 45^\circ \hat{i} - 0.015 \sin 45^\circ \hat{j}) \text{ m}$$

$$\boxed{\vec{v}_P = (4.0 \hat{i} + 4.0 \hat{j}) \text{ m/s}}$$

$$\vec{a}_P = \vec{\omega} \times \vec{v}_P - \omega^2 \vec{r}_{P/O}$$

since  $\omega$  is constant,  $\alpha = 0$

$$= - (376.8)^2 0.015 (\cos 45^\circ \hat{i} - \sin 45^\circ \hat{j})$$

$$\boxed{\vec{a}_P = (-1506 \hat{i} + 1506 \hat{j}) \text{ m/s}^2}$$