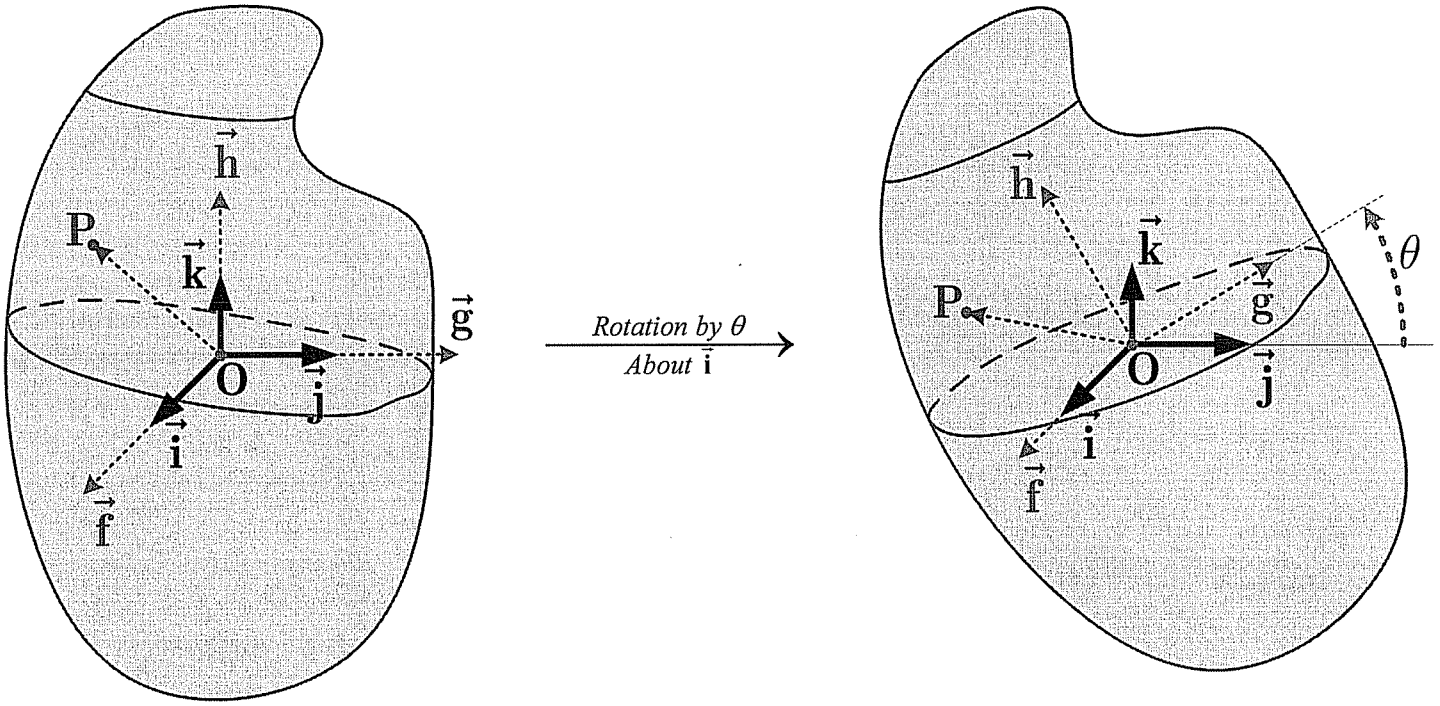
Example

Finding A and computing the angular velocity associated with rotation around $\vec{i}$ axis



$$A = [f \; g \; h]$$

$$f = i = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} \qquad \vec{g} = \vec{j}\cdot\cos\theta + \vec{k}\sin\theta \Rightarrow g = \begin{bmatrix} 0 \\ \cos\theta \\ \sin\theta \end{bmatrix}$$

$$\vec{h} = -\vec{j}\cdot\sin\theta + \vec{k}\cos\theta \Rightarrow h = \begin{bmatrix} 0 \\ -\sin\theta \\ \cos\theta \end{bmatrix} \Rightarrow A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & c\theta & -s\theta \\ 0 & s\theta & c\theta \end{bmatrix}$$

Getting ω:

By definition, $\tilde{\omega} = \dot{A}\cdot A^T$. As indicated $\theta = \theta(t)$

$$\Rightarrow \dot{A} = \dot{\theta}\begin{bmatrix} 0 & 0 & 0 \\ 0 & -s\theta & -c\theta \\ 0 & c\theta & -s\theta \end{bmatrix} \Rightarrow \tilde{\omega} = \dot{\theta}\cdot\begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & 1 & 0 \end{bmatrix}$$

$$\Rightarrow \omega = \dot{\theta}\cdot\begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix} = \begin{bmatrix} \dot{\theta} \\ 0 \\ 0 \end{bmatrix}$$