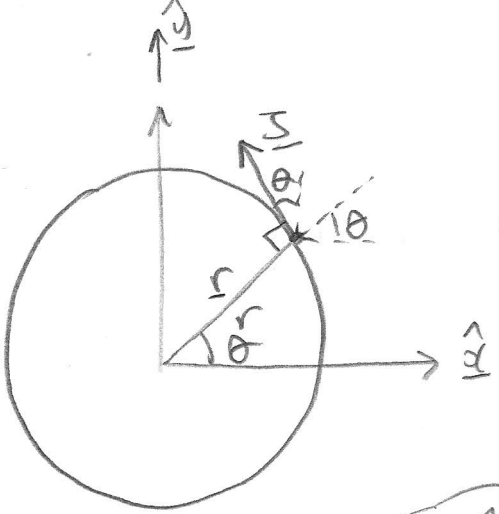
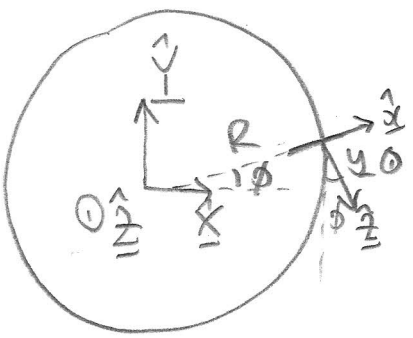


$$\underline{r} = r(\cos\theta\,\hat{\underline{x}} + \sin\theta\,\hat{\underline{y}})$$

$$\boxed{\underline{J} = J(-\sin\theta\,\hat{\underline{x}} + \cos\theta\,\hat{\underline{y}})}$$



$$\hat{\underline{x}} = \cos\phi\,\hat{\underline{X}} + \sin\phi\,\hat{\underline{Y}}$$
$$\hat{\underline{y}} = \hat{\underline{Z}}$$
$$\hat{\underline{z}} = \sin\phi\,\hat{\underline{X}} - \cos\phi\,\hat{\underline{Y}}$$

Bend coil into ring

$$\boxed{\underline{r} = r(\cos\theta\,\hat{\underline{x}} + \sin\theta\,\hat{\underline{y}}) + R\,\hat{\underline{x}}}$$

Now let N coils in ring $\therefore \boxed{\phi = \frac{\theta}{N}}$

So $\theta = \text{linspace}(0, 2\pi \times N, M)$ $\quad M \approx 1000$?

$\underline{r} = (x, y, z)$

$x = (r\cos\theta + R)\cos\phi$

$y = (r\cos\theta + R)\sin\phi$

$z = r\sin\theta$

$J_x = -J\sin\theta\cos\phi$

$J_y = -J\sin\theta\sin\phi$

$J_z = J\cos\theta$