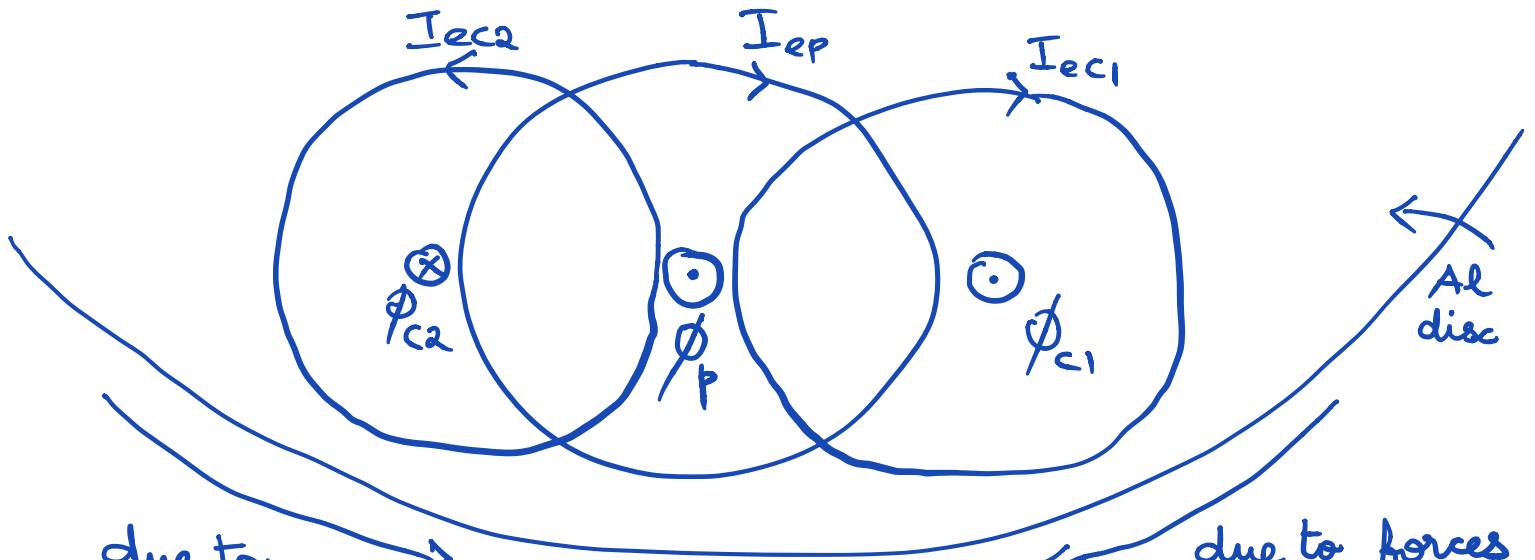


ELL301

19.02.2019

• ← centre of disc



due to forces

$\{\phi_p, I_{ec1}\}$ →

$\{\phi_p, I_{ec2}\}$ →

↖ direction of forces

due to forces

← $\{\phi_{c2}, I_{ep}\}$ &

← $\{\phi_{c1}, I_{ep}\}$

↑ direction of forces

$\sim \vec{i} \times \vec{B}$

What are forces exerted by these magnetic fluxes on these eddy currents? ↗ B

$\phi_p \sim V \sin(\omega t - 90^\circ)$

[pressure coil is inductive

$\phi_{c1}, \phi_{c2} \sim I \sin(\omega t + \theta)$

↑ phase difference

$I_{ep} \sim V \cos(\omega t - 90^\circ)$ [as $I_{ep} \sim -\frac{d\phi_p}{dt}$

$I_{ec1}, I_{ec2} \sim I \cos(\omega t + \theta)$ ["]

Net Torque =

$$\left\{ \begin{array}{l} \text{Torque generated by } \{ \phi_p, I_{ec1} \} \& \\ \{ \phi_p, I_{ec2} \} \end{array} \right\}$$
$$- \left\{ \begin{array}{l} \text{Torque generated by } \{ \phi_{c1}, I_{ep} \} \& \\ \{ \phi_{c2}, I_{ep} \} \end{array} \right\}$$

$$\sim VI \sin(\omega t - 90^\circ) \cos(\omega t + \theta)$$
$$- VI \sin(\omega t + \theta) \cos(\omega t - 90^\circ)$$

$$= VI \sin(\omega t - 90^\circ - \omega t - \theta)$$

$$= VI \sin(-90^\circ - \theta)$$

$$= VI \cos \theta$$

in the ideal case, 'cos θ ' appears. In reality, may be different due to factors such as pressure coil is not purely inductive

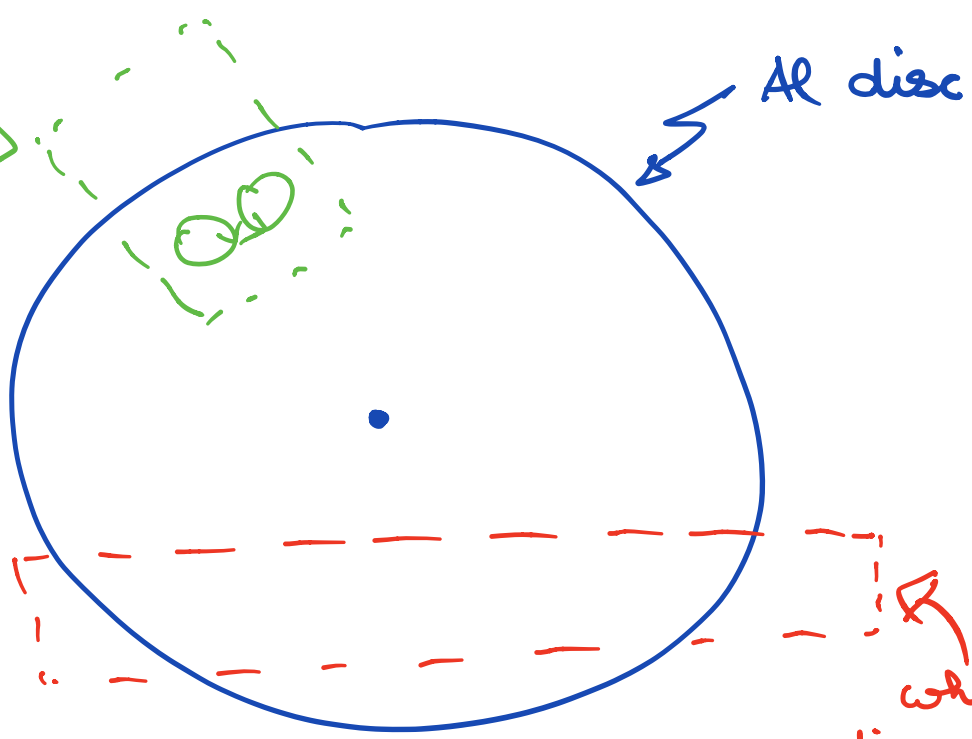
Generating torque

$$\dot{\omega} + b\omega = Z \sim \cos \theta$$

$$\text{Actually, } Z = \underset{\substack{\uparrow \\ \text{geometric} \\ \text{factors}}}{K} VI \cos \theta$$

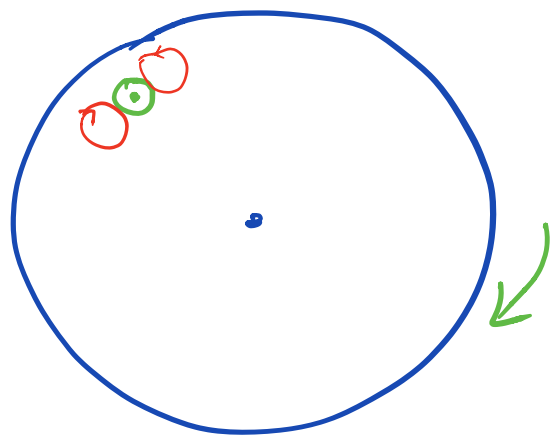
Check appropriate V_s or V_L & I_s or I_L

Permanent Magnet
"Braking System"
discussed in
before lecture



whatever
discussed in
this & previous
lecture

Question: field is \perp to disc



"Torque Generating
Subsystem"