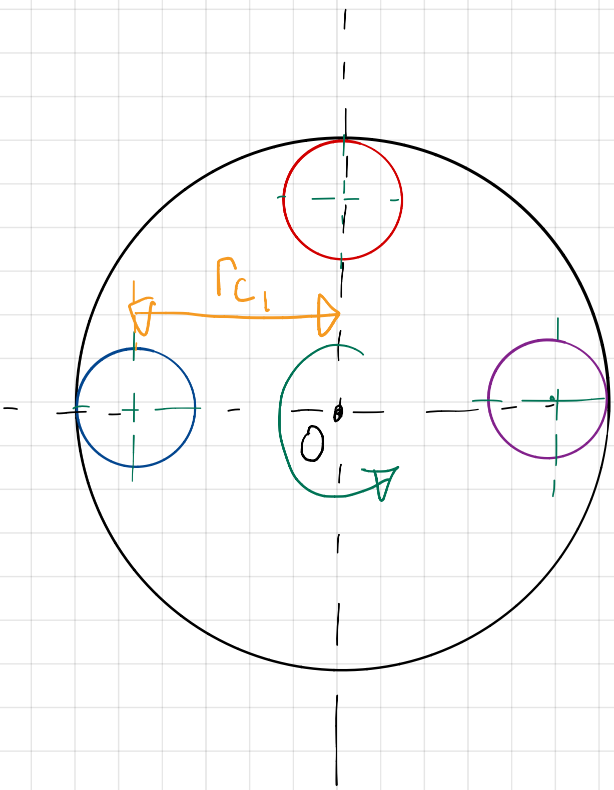
Calculation of J_2 (System 2)



- We know J_1 + disk itself.

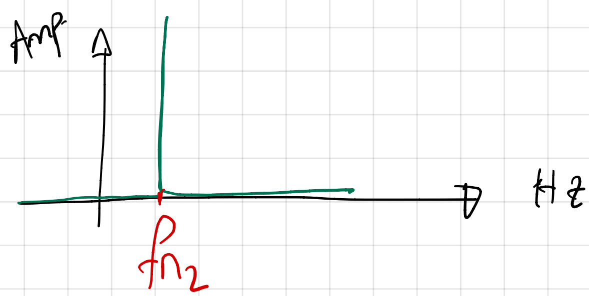
E.O.M SDOF Torsional system

$$J_2\ddot{\theta}(t) + k_T\theta(t) = 0$$

$$\ddot{\theta}(t) + \frac{k_T}{J_2}\cdot\theta(t) = 0$$

$$\omega_{n_2} = \sqrt{\frac{k_T}{J_2}}, \quad \omega_{n_2} = 2\pi f_{n_2}$$

1) Experimental Data : (J_2)



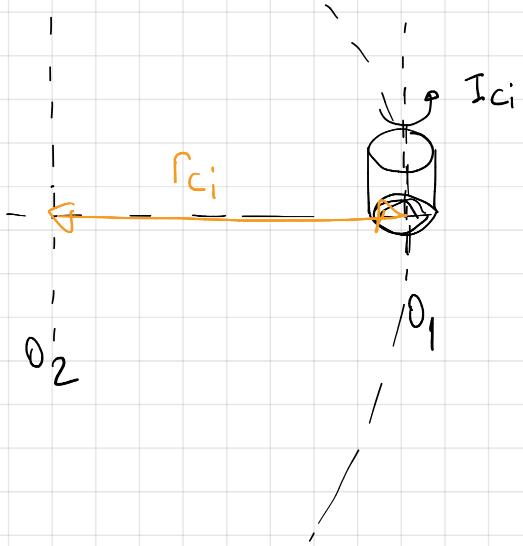
2) Point-Mass Approximation

$$J_2 = J_1 + \sum_{i=1}^{n} m_i r_{c_i}^2$$

m_i : mass of brass cylinders

r_{c_i} : distance from the center of the cylinder to the center of the disk

3) Parallel Axes Theorem



$$I_2 = I_1 + \sum_{i=1}^{n} \left[I_{c_i} + m_i r_{c_i}^2 \right]$$

r_{c_i}: distance from the center of the brass cylinder to the center of the disk.

m_i: mass of the brass cylinder.

$$I_{c_i} = \frac{1}{8} m D^2$$

D: Diameter of the brass cylinder.