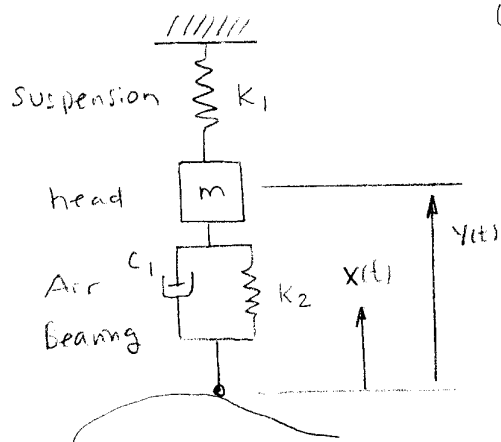


Disk Drive Head/Suspension



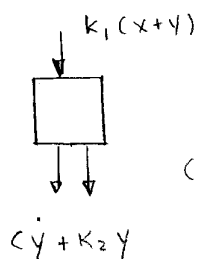
(a) $x(t)$ = motion of the disk

$y(t)$ = position of the head
relative to the disk

$$\Sigma F = -c\dot{y} - k_2 y - K_1(x+y) \\ = m(\ddot{x} + \ddot{y})$$

OR

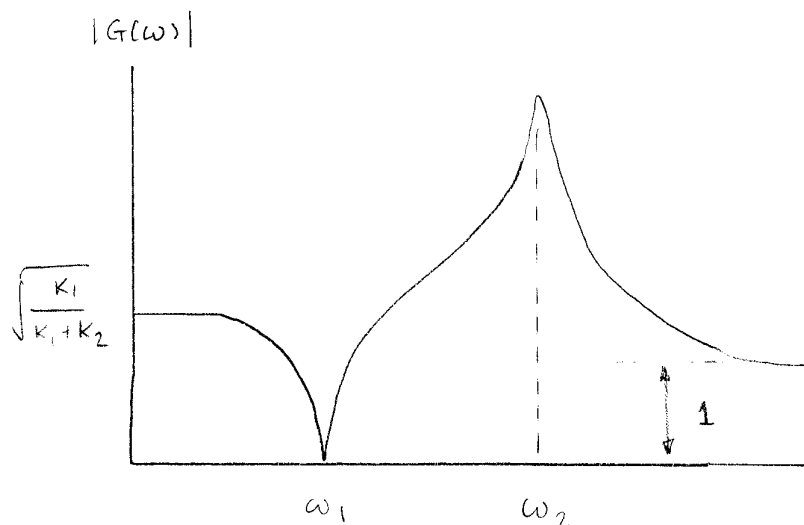
$$m\ddot{y} + c\dot{y} + (K_1 + K_2)y = -m\ddot{x} - K_1 x$$

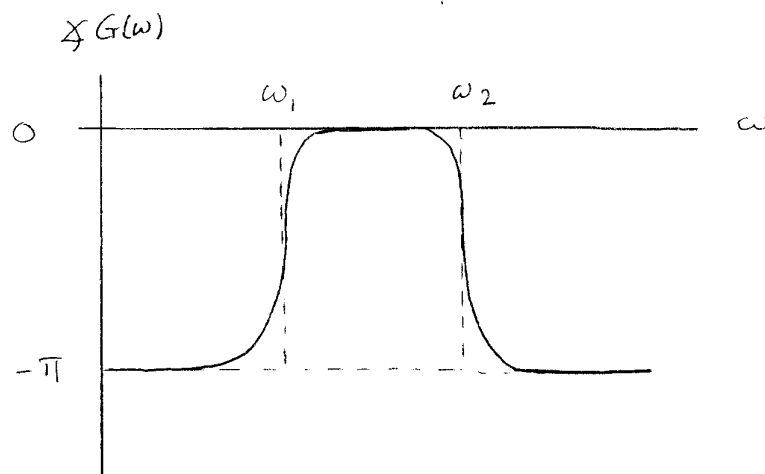


(b) FRF

$$G(\omega) = \frac{Y_o(\omega)}{X_o(\omega)} = \frac{-K_1 + m\omega^2}{[(K_1 + K_2) - m\omega^2] + j c \omega}$$

$$\omega_1 \equiv \sqrt{\frac{K_1}{m}}, \quad \omega_2 = \sqrt{\frac{K_1 + K_2}{m}}$$





$0 < \omega < \omega_1$: Slider moves in phase with the disk

$\omega_1 < \omega < \omega_2$: Slider moves out of phase with disk

(c) Design Criteria

(1) Make $\sqrt{\frac{K_1}{K_1 + K_2}} \ll 1 \Rightarrow K_1 \ll K_2$

So that the head will follow the disk

(2) make $\sqrt{\frac{K_1}{m}}$ large to reject disturbance

from the disk.