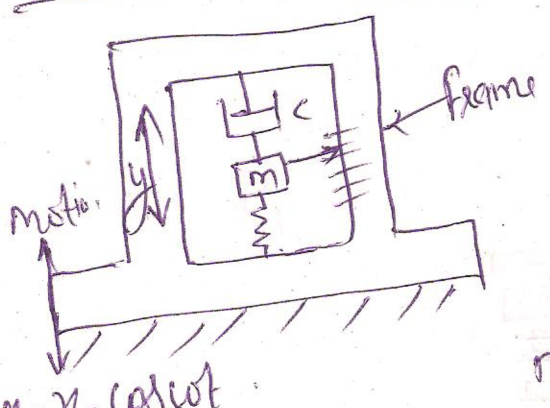
As θ is very small

∴ fringe spacing >> P.

* Absolute motion or vibration Devices :-



In these devices the base of the device or transducer is attached to the object whose motion or vibrations are to be measured. Inside transducer a mass m is supported on spring with damping coefficient c. The motion of mass relative to the ~~mass of object~~ base will give indication of motion of object & inturn output also

Let $x = x_0 \cos\omega t$

where x_0 = Amplitude of motion. ω = circular frequency (ω = 2πf) t = time variable

∴ Equation of motion of mass

∴ $m\ddot{y} = -c(\dot{y}-\dot{x}) - K(y-x)$ $y - x = z$ = motion relative to frame

The equation may be written as

$$m\ddot{z} + c\dot{z} + Kz = m\omega^2 x_0 \cos\omega t$$

For steady state value

$$z = z_0 \cos(\omega t - \psi)$$

Amplitude $$z_0 = \frac{m\omega^2 x_0}{\sqrt{(K - m\omega^2)^2 + (c\omega)^2}}$$

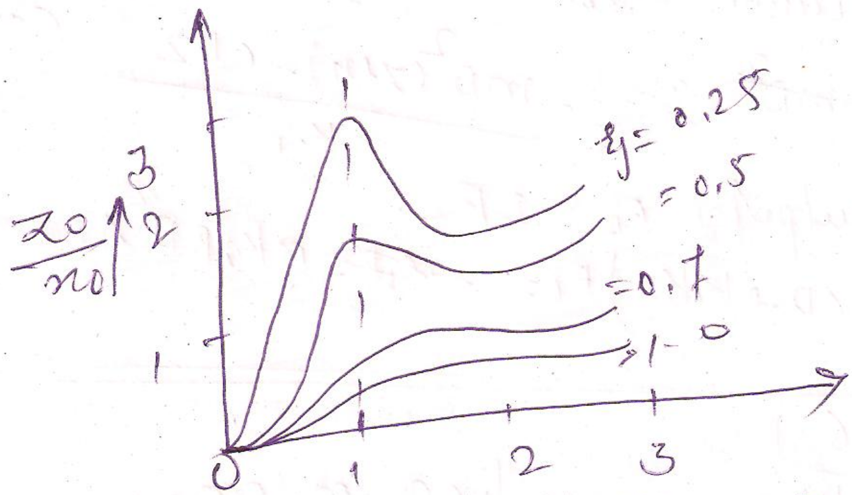
Amplitude Ratio $$\frac{z_0}{x_0} = \frac{r^2}{\sqrt{(1-r^2)^2 + (2\xi r)^2}}$$

$r = \frac{\omega}{\omega_n}$

$\omega_n = \sqrt{\frac{K}{m}}$ = Undamped natural fre

ω = circular fr

$\xi_y = \frac{c}{2\sqrt{Km}}$ = damping ratio



it can seen that at $\xi_y = 0.7$ the curve are flat & $r > \sqrt{2}$

The eqn can also written as

$$\frac{\omega_n^2 Z_0}{\omega^2 x_0} = \frac{r}{\sqrt{(1-r^2)^2 + (2\xi_y r)^2}}$$

or $\frac{\omega_n^2 Z_0}{A_0}$ = "

where $A_0 = \omega^2 x_0$ = Amplitude Acceleration of object.

* Force balance type seismic devices :-

Unlike in the seismic devices mechanical spring is not used. An electromagnetic actuator and force is applied to mass m. At equilibrium output current i & voltage E produce across R being the output & measure of input motion x.