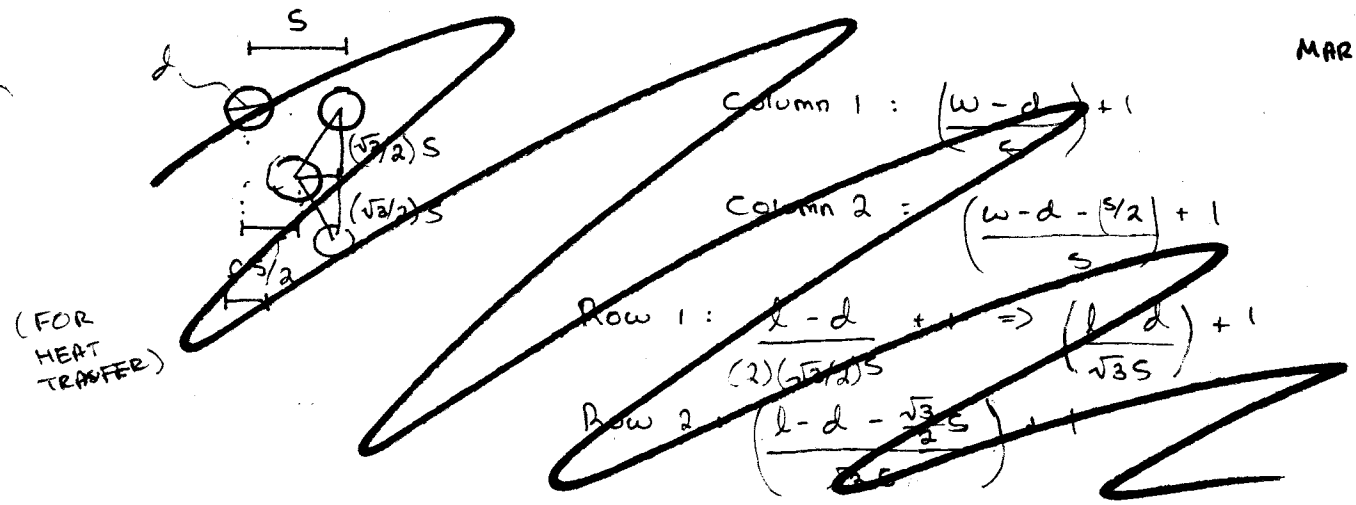
MAR. 26/19



$$x = r\cos\omega t + \sqrt{l^2 - (r\sin\omega t)^2} = r\cos\omega t + l\sqrt{1 - (r/l \sin\omega t)^2}$$

$$\dot{x} = \frac{dx}{dt} = -r\omega\sin\omega t + l(1 - (r/l \sin\omega t)^{1/2 - 1}\, d/dt(1 - (r/l \sin\omega t)^2)$$

$$d/dt \sin^2\omega t = 2\sin\omega t(-\cos\omega t) = -\sin 2\omega t$$

$$[(1 - (r/l \sin\omega t)^2]^{1/2}$$

$a = 1$

$b = -(r/l \sin\omega t)^2$

$n = 1/2$

$r/l \ll 1 \qquad (r/l)^n \; n > 1$

$\omega = 2\pi f$

2ω

$B = 3.n$

Stroke $= 3.54$ in

$B/S = 0.85$

$L/R = 3.6, \quad R/L = 1/3.6 \ll 1$

$\Sigma F = m\ddot{x}$

$\Sigma F - m\ddot{x} = 0$

↳ inertia Force

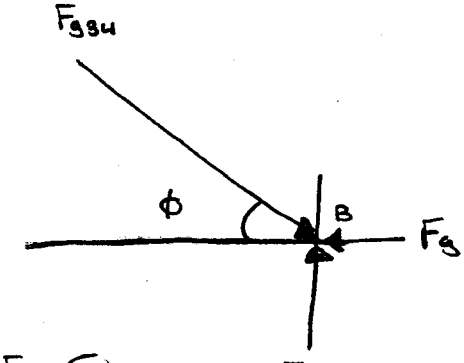
$T_{i;}$

↳ link Force is acting

↳ link that applies

$\hat{i}$ = unit vector in x-axis

$A_p = \pi/4\, B^2$



$\Sigma F_x = 0$

↳ $F_{gsx} \cdot \cos\phi = F_g$ (1)

$\Sigma F_g = 0$

↳ $F_{gsx} \cdot \sin\phi = F_{gsy}$ (2)

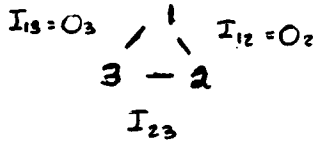
(2)/(1) = $\tan\phi$

MAR. 27/19

$P = T \times \omega$

Power is rating

backlash - impact



$N_p = 10$ $N_g = 20$

$n_p = 100$ RPM $n_g = 50$ RPM

Common normal line

$V_p = \omega_2 \overline{O_2 \cdot P} = \omega_3 \overline{O_3 P}$

m_v = const. P is Fixed point

$\omega_3 = m_v \omega_2$

$\overline{O_2 P} = r_p$ (radius of pitch circle)

$\overline{O_3 P} = r_g$

$p_c = \frac{\pi d}{N}$ (Pitch circle) $\quad p_c = \pi / N/d = \pi / p_d$

where d = diameter of pitch circle

N = No. of teeth

$p_d = \frac{N}{d}$ $\left(\frac{\text{teeth}}{\text{in}}\right)$ → Small number, large teeth (stronger)

large number, small teeth (weaker)

$m_p = 1$ (one pair in teeth in contact)

preferred → $m_p < 1$ (brief period where there is no contact

$m_p > 1$ (some overlapping period of contact)