

$$\Rightarrow \ddot{x} + \omega_0^2 (1 + h \cos(2\omega_0 + \epsilon)t) x = 0$$

Look for solutions of the form

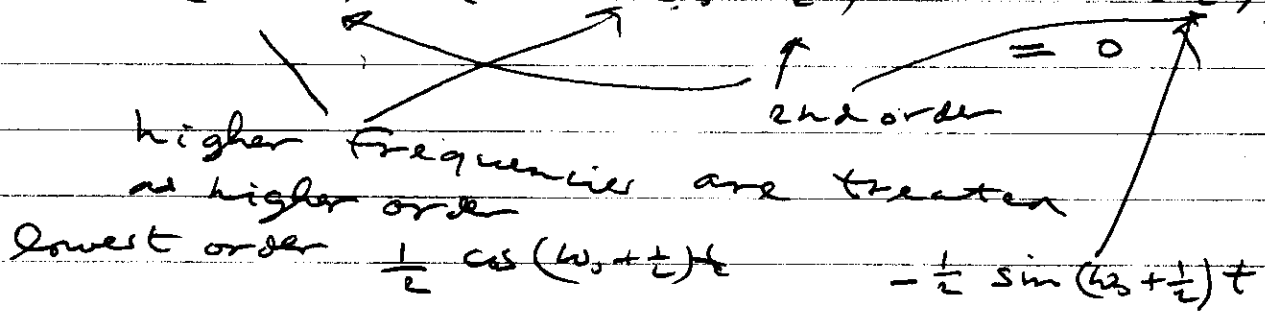
$$x = a(t) \cos(\omega_0 + \frac{1}{2}\epsilon)t + b(t) \sin(\omega_0 + \frac{1}{2}\epsilon)t$$

we assume that $\dot{a}(t) \sim \epsilon a(t)$
 $\dot{b}(t) \sim \epsilon b(t)$

$$\Rightarrow \ddot{a} \approx \epsilon^2 a(t) \quad \text{neglect}$$

$$\ddot{b} \approx \epsilon^2 b(t)$$

$$\Rightarrow -\dot{a}(\omega_0 + \frac{1}{2}\epsilon) \sin(\omega_0 + \frac{1}{2}\epsilon)t + \dot{b}(\omega_0 + \frac{1}{2}\epsilon) \cos(\omega_0 + \frac{1}{2}\epsilon)t - (\omega_0 + \frac{1}{2}\epsilon)^2 (a(t) \cos(\omega_0 + \frac{1}{2}\epsilon)t + b(t) \sin(\omega_0 + \frac{1}{2}\epsilon)t) + \omega_0^2 (a(t) \cos(\omega_0 + \frac{1}{2}\epsilon)t + b(t) \sin(\omega_0 + \frac{1}{2}\epsilon)t) + h\omega_0^2 \cos(2\omega_0 + \epsilon)t (a(t) \cos(\omega_0 + \frac{1}{2}\epsilon)t + b(t) \sin(\omega_0 + \frac{1}{2}\epsilon)t) = 0$$



coefficients of $\cos(\omega_0 + \frac{1}{2}\epsilon)t$ and $\sin(\omega_0 + \frac{1}{2}\epsilon)t$ should both vanish

$$\Rightarrow -\dot{a}(\omega_0 + \frac{\epsilon}{2}) - \omega_0 \epsilon b - \frac{h}{2} \omega_0^2 b = 0$$

$$\dot{b}(\omega_0 + \frac{\epsilon}{2}) - \omega_0 \epsilon a + \frac{h}{2} \omega_0^2 a = 0$$

look for solution of the form $a = a_0 e^{st}$
 $b = b_0 e^{st}$

$$\Rightarrow \begin{pmatrix} -s(\omega_0) & -\omega_0 \epsilon - \frac{h}{2} \omega_0^2 \\ -\omega_0 \epsilon + \frac{h}{2} \omega_0^2 & s \omega_0 \end{pmatrix} \begin{pmatrix} a_0 \\ b_0 \end{pmatrix} = 0$$