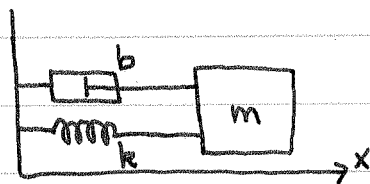


Dempet:



$$F = -kx - b\dot{x}$$

$$\Rightarrow m\ddot{x} + b\dot{x} + kx = 0$$

Overdempet: $\delta \equiv b/2m > \omega_0 \equiv \sqrt{k/m}$

$$x(t) = A e^{-(\delta+\gamma)t} + B e^{-(\delta-\gamma)t}$$

Underdempet: $\delta < \omega_0$

$$x(t) = A e^{-\delta t} \cos(\omega t + \varphi) \quad (\omega \equiv \sqrt{\omega_0^2 - \delta^2})$$

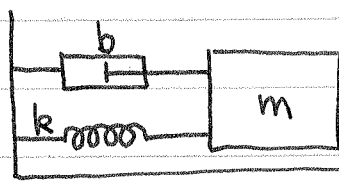
Kritisk:

damping

$$\delta = \omega_0$$

$$x(t) = A e^{-\delta t} + B t e^{-\delta t}$$

Tvungen svingning, resonans:



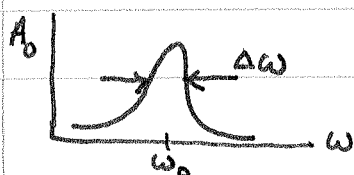
$$F = F_0 \cos \omega t$$

$$m\ddot{x} + b\dot{x} + kx = F_0 \cos \omega t$$

$$x(t) = x_h(t) + x_p(t) \approx x_p(t) \quad \text{hvis } t \gg \delta \quad (\text{fordi } x_h \sim e^{-\delta t})$$

$$x_p(t) = A_0 \sin(\omega t + \varphi_0)$$

$$A_0 = \frac{F_0}{m \sqrt{(\omega^2 - \omega_0^2)^2 + (b\omega/m)^2}} \quad ; \quad \tan \varphi_0 = \frac{\omega^2 - \omega_0^2}{\omega b/m}$$

Resonans ($\max A_0$) ved $\omega \approx \omega_0$ Halvverdbreddde: $\Delta\omega$