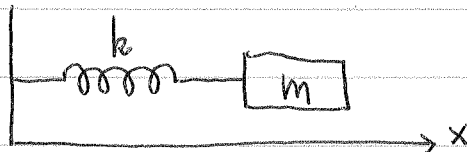


I. Svingninger

Udempet:



$$F = ma \Rightarrow -kx = m\ddot{x} \Rightarrow \ddot{x} + \omega^2 x = 0 \quad (\omega^2 = k/m)$$

Løsning: $x(t) = A \cos(\omega t + \varphi)$

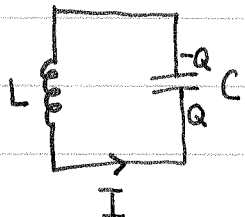
evt. $x(t) = B \cos \omega t + C \sin \omega t$

$\{A, \varphi\}$ evt $\{B, C\}$ fastlegges fra 2 initialbetingelser, f.eks. $x(0)$ og $\dot{x}(0)$

A = amplitude; ω = vinkel frekvens; φ = fasekonstant;
 $f = \omega/2\pi$ = frekvens; $T = 1/f$ = periode

$$\left. \begin{array}{l} \text{Kinetisk energi: } E_k = \frac{1}{2} m \dot{x}^2 \\ \text{Potensiell " " : } E_p = - \int_0^x F dx = \frac{1}{2} k x^2 \end{array} \right\} \begin{array}{l} \text{Total energi:} \\ E = E_k + E_p = \frac{1}{2} k A^2 \\ (= \text{konstant}) \end{array}$$

Elektrisk analogi:



$$L\ddot{Q} + \frac{1}{C} Q = 0$$

$$\Rightarrow Q(t) = Q_0 \cos(\omega t + \varphi) \quad (\omega^2 = 1/LC)$$

Analoge størrelser: $x \leftrightarrow Q$; $\dot{x} \leftrightarrow I$; $k \leftrightarrow 1/C$;
 $m \leftrightarrow L$