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AP 1998 – AIII

1.1 allgemein: $D = \frac{\Delta F}{\Delta s}$

$$D_1 = \frac{15\,N}{5{,}0\,cm} = 3{,}0\ \frac{N}{cm} \quad ; \quad D_2 = \frac{12\,N}{6\,cm} = 2{,}0\ \frac{N}{cm} = 2{,}0 \cdot 10^2\ \frac{N}{m}$$

1.2.1 $s_g = s_1 + s_2$; $s = \frac{F}{D}$

$$\frac{F_G}{D_g} = \frac{F_1}{D_1} + \frac{F_2}{D_2} \quad ; \text{ weil } F_G = F_1 = F_2 : \frac{1}{D_g} = \frac{1}{D_1} + \frac{1}{D_2}$$

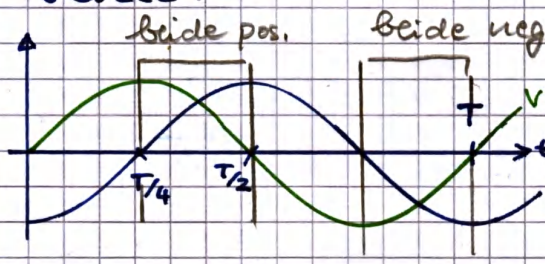
$$\frac{1}{D_g} = \frac{1}{2{,}0\,N/cm} + \frac{1}{3{,}0\,N/cm} = \frac{5}{6}\ \frac{cm}{N} \Rightarrow D_g = 1{,}2\ \frac{N}{cm}$$

1.3.1 $T = 2\pi \sqrt{\frac{m}{D_g}} = 2\pi \cdot \left(\frac{0{,}463\,kg}{1{,}2 \cdot 10^2\,N\,m^{-1}}\right)^{1/2} = 0{,}40\,s$

1.3.2 $s(t) = -A \cdot \cos(\omega t) \Rightarrow v(t) = \dot{s}(t) = A\omega \sin\left(\frac{2\pi}{T} t\right)$

$$v(t) = 5{,}0\,cm \cdot \frac{2\pi}{0{,}40\,s} \cdot \sin\left(\frac{2\pi}{0{,}40\,s} \cdot t\right) = 79\ \frac{cm}{s} \cdot \sin(5\pi s^{-1} \cdot t)$$

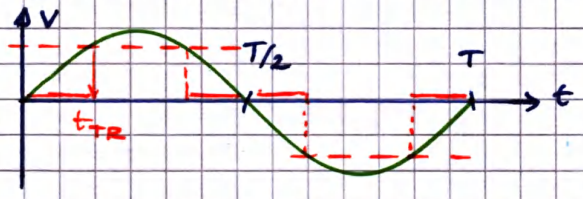
1.3.3 Skizze:



$[T/4 ; T/2] = [0{,}10\,s ; 0{,}20\,s]$

$\left[\frac{3T}{4} ; T\right] = [0{,}30\,s ; 0{,}40\,s]$

1.3.4 $0{,}59\, v_{max} = v_{max} \cdot \sin(\omega t) \Leftrightarrow t_{TR} = \frac{\sin^{-1}(0{,}59)}{5{,}0\pi\,s^{-1}} = 0{,}040\,s$



$t_1 = t_{TR} = 0{,}040\,s$

$t_2 = \frac{T}{2} - t_{TR} = 0{,}16\,s$

$t_3 = T/2 + t_{TR} = 0{,}24\,s$

$t_4 = T - t_{TR} = 0{,}36\,s$

1.3.5 $E_k(t) = \frac{1}{2} m (A\omega)^2 \sin^2(\omega t)$