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ME06

Inlämningsuppgifter 1

Uppgift 1.5:

$\bar{v} = 10(4,12,3)\, m/s$

$\bar{a} = (10,-2,-1)\, m/s^2$

$$\bar{e}_v = \frac{\bar{v}}{v} = \frac{10(4,12,3) m/s}{10\sqrt{4^2+12^2+3^2}\, m/s} = \frac{(4,12,3)}{\sqrt{16+144+9}} = \frac{(4,12,3)}{\sqrt{169}} = \frac{(4,12,3)}{13}$$

$$a_t = \bar{a} \cdot \bar{e}_v = (10,-2,-1) m/s^2 \cdot \frac{(4,12,3)}{13} = \frac{40-24-3}{13} m/s^2 = \frac{13}{13} m/s^2 = 1 m/s^2$$

$$\bar{a}_t = a_t \bar{e}_v = 1 m/s^2 \frac{(4,12,3)}{13} = \frac{(4,12,3)}{13} m/s^2$$

$$\bar{a}_n = \bar{a} - \bar{a}_t = (10,-2,-1) m/s^2 - \frac{(4,12,3)}{13} m/s^2 = \frac{(130,-26,-13)-(4,12,3)}{13} m/s^2 = \frac{(126,-38,-16)}{13} m/s^2$$

Svar: $\bar{a}_t = \frac{(4,12,3)}{13} m/s^2$

$\bar{a}_n = \frac{(126,-38,-16)}{13} m/s^2$

Uppgift 2.7:

$m = C \cdot r^a \cdot \sigma^b \cdot g^c$

dim (σ) = dim (F / A) = $ML^{-1}T^{-2}$ (tillagt av Göran Karlsson)

$\{\sigma\} = \{F / A\}$ betyder att enheten för σ är $kgms^{-2}m^{-2} = kgm^{-1}s^{-2}$.

Variabel:	m	r	σ	g
Enhet:	kg	m	$kgm^{-1}s^{-2}$	ms^{-2}
Dimension:	M	L	$ML^{-1}T^{-2}$	LT^{-2}

$VL = M$

$$HL = 1 \cdot L^a \cdot (ML^{-1}T^{-2})^b \cdot (LT^{-2})^c = L^a \cdot M^b L^{-b} T^{-2b} \cdot L^c T^{-2c} = L^{a-b+c} M^b T^{-2b-2c}$$

$$\begin{cases} M: & 1 = b \\ T: & 0 = -2b - 2c \Rightarrow c = -b = -1 \\ L: & 0 = a - b + c \Rightarrow a = b - c = 1 - (-1) = 2 \end{cases}$$

$$m = C \cdot r^a \cdot \sigma^b \cdot g^c = C \cdot r^2 \cdot \sigma^1 \cdot g^{-1} = C \frac{\sigma r^2}{g}$$

Svar: $m = C \frac{\sigma r^2}{g}$