Svar till övningsuppgifter i kursen TMMI39 (jämna tal, upplaga 6, Meriam & Kraige)

Joakim Holmberg

November 14, 2014

STATIK

2.104 $\boldsymbol{T} = (-0.876\boldsymbol{i} + 0.438\boldsymbol{j} + 2.19\boldsymbol{k})$ kN , $T_{AC} = 2.06\,\text{kN}$

2.108 $\boldsymbol{T} = (-598\boldsymbol{i} + 411\boldsymbol{j} + 189.5\boldsymbol{k})$ N

3.62 $T_A = 44\,\text{N}$, $T_B = 44\,\text{N}$, $T_C = 59\,\text{N}$

3.68 $T_A = 224\,\text{N}$, $T_B = 129.6\,\text{N}$, $T_C = 259\,\text{N}$

3.82 $F_{AC} = F_{CB} = 240\,\text{N}$ (drag) , $F_{CD} = 1046\,\text{N}$ (tryck)

3.108 $A = 184\,\text{N}$, $B = 424\,\text{N}$

DYNAMIK

5.2

(a) $\boldsymbol{v}_A = 270\boldsymbol{i}$ mm/s , $\boldsymbol{a}_A = (-180\boldsymbol{i} - 1620\boldsymbol{j})$ mm/s^2

(b) $\boldsymbol{v}_B = (270\boldsymbol{i} + 180\boldsymbol{j})$ mm/s , $\boldsymbol{a}_B = (900\boldsymbol{i} - 1740\boldsymbol{j})$ mm/s^2

5.6 $\alpha = 6\,\text{rad/s}^2$, $\omega = 4\,\text{rad/s}$

5.14 $\boldsymbol{v}_A = (1.68\boldsymbol{i} - 1.8\boldsymbol{j})$ m/s , $\boldsymbol{a}_A = (-10.8\boldsymbol{i} - 10.08\boldsymbol{j})$ m/s^2

5.66 $v_O = 8.49\,\text{m/s}$, $\omega = 26.1\,\text{rad/s}$

5.100 $v_A = 0.707\,\text{m/s}$, $v_P = 1.581\,\text{m/s}$

5.108 $v_C = 1.9\,\text{m/s}$

5.126 $\alpha_{AB} = 0.1768\,\text{rad/s}^2$ (medurs)

5.154 $a_G = 15.40$ m/s^2

5.156 $a_C = 23.4$ m/s^2

6.28 $N = 257\,\mathrm{kN}$

B.12 $I_{OO} = m\frac{181}{4800}\,\mathrm{kg\cdot m^2}$ ($I_{OO} = 2.2\,\mathrm{kg\cdot m^2}$ med stål enl. tab. D/1)

6.44 $b = 53.6\,\mathrm{mm}$, $R = 71.6\,\mathrm{N}$

6.64 $\alpha = 31.4\,\mathrm{rad/s^2}$, $F = 132.7\,\mathrm{N}$

6.94 $A_x = \frac{3M}{2\sqrt{2}l}$, $B_y = -A_x$

6.98 $a_A = \frac{g\sin\theta}{1-\frac{3}{4}\cos^2\theta}$

6.116 $\omega = 3.07\,\mathrm{rad/s}$, oberoende av massan

6.118 $\theta = 33.2^\circ$

6.148 $v = 3.04\,\mathrm{m/s}$

6.220 $v_A = 3.70\,\mathrm{m/s}$ (farten)

7.8 $\boldsymbol{\omega} = p\boldsymbol{j} + \omega_0\boldsymbol{k}$, $\boldsymbol{\alpha} = -p\omega_0\boldsymbol{i}$

7.12 $\boldsymbol{\alpha} = 12\pi^2\boldsymbol{j}\,\mathrm{rad/s^2}$, $\boldsymbol{v}_A = \pi\left(-\frac{1}{2}\boldsymbol{i} + \frac{3}{4}\boldsymbol{j} - 0.375\boldsymbol{k}\right)\,\mathrm{m/s}$, $\boldsymbol{a}_A = -0.125\pi^2\left(25\boldsymbol{j} + 18\boldsymbol{k}\right)\,\mathrm{m/s^2}$

7.42 $\boldsymbol{\alpha} = \left(-3\boldsymbol{i} - 4\boldsymbol{j}\right)\,\mathrm{rad/s^2}$

7.46 $\boldsymbol{\alpha} = -40\pi^2\boldsymbol{i}\,\mathrm{rad/s^2}$, $\boldsymbol{a}_A = \pi^2\left(-\frac{24}{5}\boldsymbol{i} + 8\boldsymbol{j} - 10\boldsymbol{k}\right)\,\mathrm{m/s^2}$

7.54 $\boldsymbol{H}_G = \left(-1.613\boldsymbol{j} - 744\boldsymbol{k}\right)\,\mathrm{kg\cdot m^2/s}$,
$\boldsymbol{H}_A = \left(-537.5\boldsymbol{i} - 2.70\boldsymbol{j} - 744\boldsymbol{k}\right)\,\mathrm{kg\cdot m^2/s}$

7.74 $A_x = B_x = 0$, $A_y = -\frac{mR\omega^2}{3}$, $B_y = -A_y$

7.92 $A = \frac{mg}{6}$

7.100 $b = 216\,\mathrm{mm}$

7.114 $R_A = 37.5\,\mathrm{N}$, $R_B = 60.5\,\mathrm{N}$

7.116 $\boldsymbol{M} = 8.30\boldsymbol{i}\,\mathrm{N\cdot m}$