ZADATAK 1.2

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(1) $m\ddot{x} + D\dot{x} + C(x-l) + \frac{\varepsilon_0 A}{2}\left(\frac{U}{x}\right)^2 = F$

(2) $\varepsilon_0 A\left(\frac{\dot{U}}{x}\right) = \frac{U_s}{R} - \frac{U}{R}\cdot\frac{\dot{x}}{x}$

(3) $y = R\varepsilon_0 A\left(\frac{\dot{U}}{x}\right)$

$m = 8{,}5\cdot 10^{-3}\,kg$ $\quad U_s = 1{,}25\,V$

$D = 250\,kg/s$ $\quad R = 20000\,\Omega$

$C = 2\,kg/s^2$ $\quad x_0 = 50\cdot 10^{-3}\,m$

$l = 7{,}5\cdot 10^{-3}\,m$ $\quad \varepsilon_0 = 8{,}854\cdot 10^{-12}\,F/m$

$A = 45\cdot 10^{-4}\,m^2$

RADNA TOČKA:

(1) $C(x_0-l) + \frac{\varepsilon_0 A}{2}\left(\frac{U_0}{x_0}\right)^2 = F_0 \rightarrow F_0 = 0{,}085\,N$

(2) $U_0 = U_s \rightarrow U_0 = 1{,}25\,V$

(3) $y_0 = 0$

$x_1 = x, \quad x_2 = \dot{x}, \quad x_3 = \frac{U}{x}$

(0) $\dot{x}_1 = x_2$

(1) $\dot{x}_2 = \frac{1}{m}F - \frac{D}{m}x_2 - \frac{C}{m}(x_1-l) - \frac{\varepsilon_0 A}{2m}x_3^2$

(2) $\dot{x}_3 = \frac{U_s}{\varepsilon_0 A R} - \frac{1}{\varepsilon_0 A R}x_1 x_3$

(3) $y = R\varepsilon_0 A\,\dot{x}_3$

STATIČKA TOČKA:

$x_{10} = 50\cdot 10^{-3}\,m$ $\quad x_{30} = 25$

$x_{20} = 0\,m/s$ $\quad y_0 = 0$

LINEARIZACIJA OKO RADNE TOČKE:

(0) $\Delta\dot{x}_1 = \Delta x_2$

(1) $\Delta\dot{x}_2 = \frac{1}{m}\Delta F - \frac{D}{m}\Delta x_2 - \frac{C}{m}\Delta x_1 - \frac{\varepsilon_0 A}{m} x_{30}\,\Delta x_3$

(2) $\Delta\dot{x}_3 = -\frac{1}{\varepsilon_0 A R} x_{30}\,\Delta x_1 - \frac{1}{\varepsilon_0 A R} x_{10}\,\Delta x_3$

(3) $\Delta y = R\varepsilon_0 A\,\Delta\dot{x}_3$

NAKON ŠTO UVRSTIMO VRIJEDNOSTI:

(0) $\Delta\dot{x}_1 = \Delta x_2$

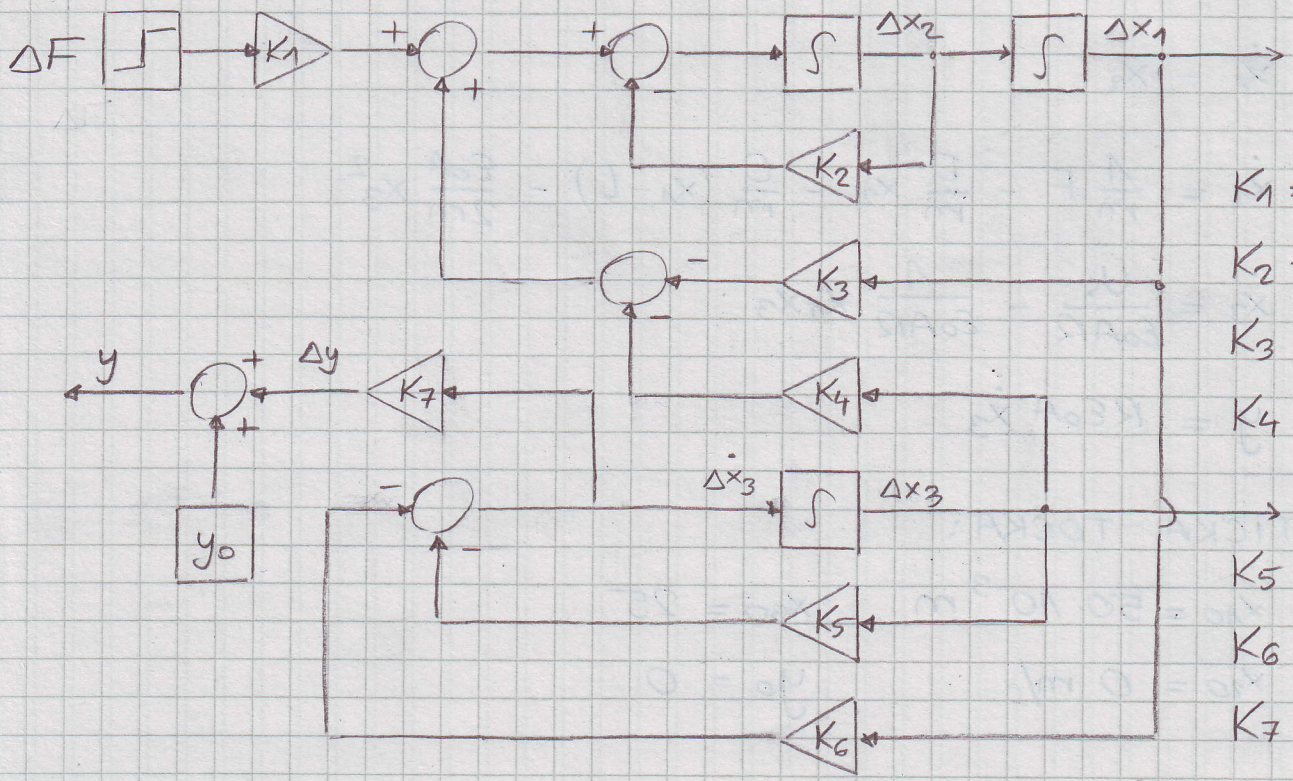
(1) $\Delta\dot{x}_2 = 117{,}647\,\Delta F - 2{,}94\cdot 10^{4}\,\Delta x_2 - 235{,}29\,\Delta x_1 - 1{,}172\cdot 10^{-10}\,\Delta x_3$

(2) $\Delta\dot{x}_3 = -3{,}137\cdot 10^{10}\,\Delta x_1 - 6{,}275\cdot 10^{7}\,\Delta x_3$

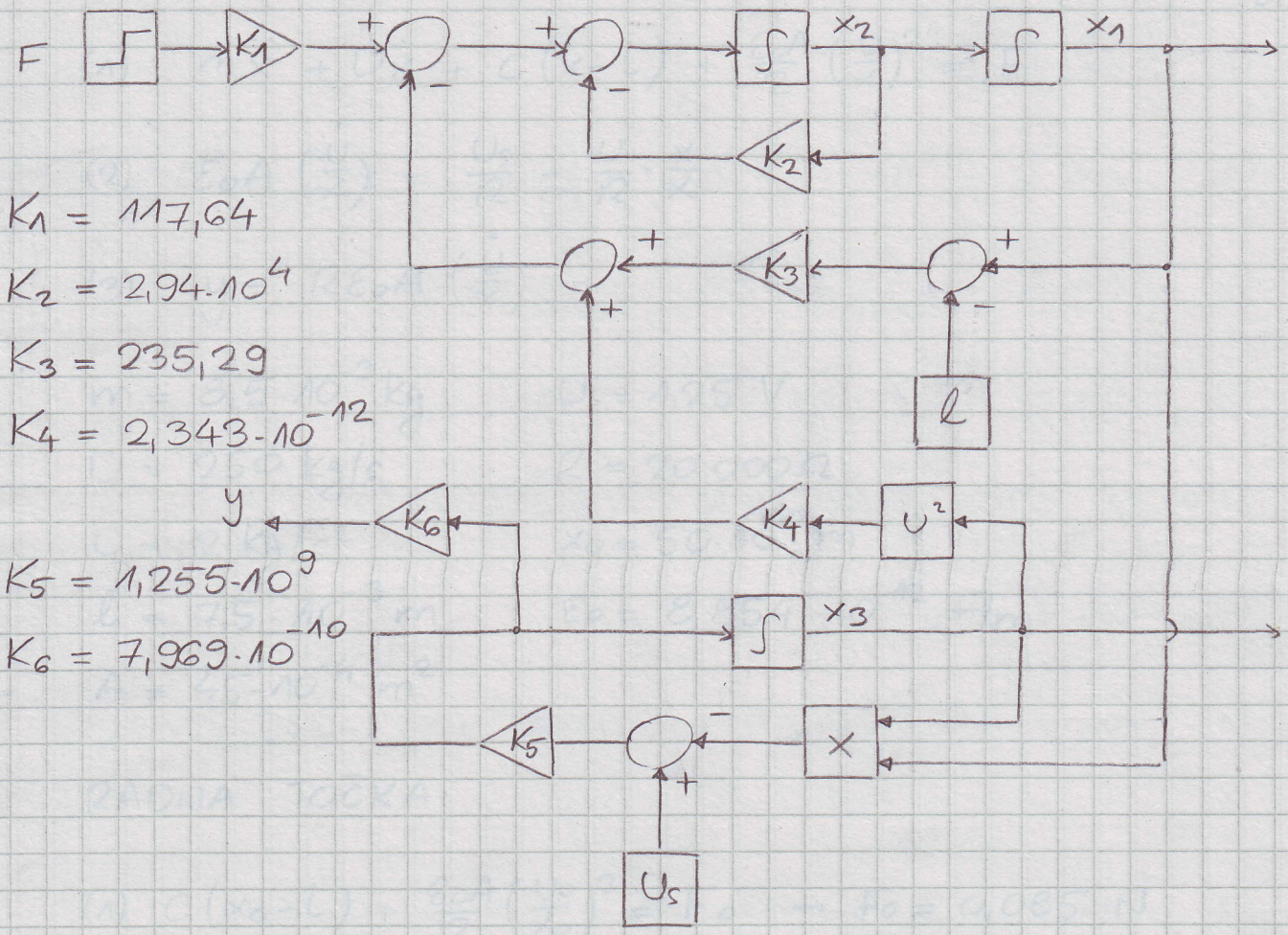
(3) $\Delta y = 7{,}969\cdot 10^{-10}\,\Delta\dot{x}_3$

$\Delta y = -25\,\Delta x_1 - 50\cdot 10^{-3}\,\Delta x_3$

LINEARNA BLOKOVSKA SHEMA:



NELINEARNA BLOKOVSKA SHEMA:



$K_1 = 117,64$

$K_2 = 2,94 \cdot 10^{4}$

$K_3 = 235,29$

$K_4 = 2,343 \cdot 10^{-12}$

$K_5 = 1,255 \cdot 10^{9}$

$K_6 = 7,969 \cdot 10^{-10}$