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17/ENG04/011

ELECTRICAL/ELECTRONICS ENGINEERING

GAUSS ELIMINATION METHOD

$$a := \begin{pmatrix} 2 & 2 & -4 & 2 & 6 & -2 \\ 4 & -2 & 2 & 4 & 2 & -6 \\ 2 & 6 & -6 & -2 & 4 & 2 \\ 10 & 4 & -2 & -2 & 4 & 2 \\ -6 & -2 & 4 & 6 & 2 & 6 \\ 8 & 6 & 2 & -12 & -6 & -4 \end{pmatrix} \quad b := \begin{pmatrix} 12 \\ 60 \\ -45 \\ -9 \\ 48 \\ -81 \end{pmatrix}$$

$$a1 := \begin{bmatrix} 2 & 2 & -4 & 2 & 6 & -2 \\ a_{1,0} - \left(\frac{a_{1,0}}{a_{0,0}} \right) \cdot (a_{0,0}) & a_{1,1} - \left(\frac{a_{1,0}}{a_{0,0}} \right) \cdot (a_{0,1}) & a_{1,2} - \left(\frac{a_{1,0}}{a_{0,0}} \right) \cdot (a_{0,2}) & a_{1,3} - \left(\frac{a_{1,0}}{a_{0,0}} \right) \cdot (a_{0,3}) & a_{1,4} - \left(\frac{a_{1,0}}{a_{0,0}} \right) \cdot (a_{0,4}) & a_{1,5} - \left(\frac{a_{1,0}}{a_{0,0}} \right) \cdot (a_{0,5}) \\ a_{2,0} - \left(\frac{a_{2,0}}{a_{0,0}} \right) \cdot (a_{0,0}) & a_{2,1} - \left(\frac{a_{2,0}}{a_{0,0}} \right) \cdot (a_{0,1}) & a_{2,2} - \left(\frac{a_{2,0}}{a_{0,0}} \right) \cdot (a_{0,2}) & a_{2,3} - \left(\frac{a_{2,0}}{a_{0,0}} \right) \cdot (a_{0,3}) & a_{2,4} - \left(\frac{a_{2,0}}{a_{0,0}} \right) \cdot (a_{0,4}) & a_{2,5} - \left(\frac{a_{2,0}}{a_{0,0}} \right) \cdot (a_{0,5}) \\ a_{3,0} - \left(\frac{a_{3,0}}{a_{0,0}} \right) \cdot (a_{0,0}) & a_{3,1} - \left(\frac{a_{3,0}}{a_{0,0}} \right) \cdot (a_{0,1}) & a_{3,2} - \left(\frac{a_{3,0}}{a_{0,0}} \right) \cdot (a_{0,2}) & a_{3,3} - \left(\frac{a_{3,0}}{a_{0,0}} \right) \cdot (a_{0,3}) & a_{3,4} - \left(\frac{a_{3,0}}{a_{0,0}} \right) \cdot (a_{0,4}) & a_{3,5} - \left(\frac{a_{3,0}}{a_{0,0}} \right) \cdot (a_{0,5}) \\ a_{4,0} - \left(\frac{a_{4,0}}{a_{0,0}} \right) \cdot (a_{0,0}) & a_{4,1} - \left(\frac{a_{4,0}}{a_{0,0}} \right) \cdot (a_{0,1}) & a_{4,2} - \left(\frac{a_{4,0}}{a_{0,0}} \right) \cdot (a_{0,2}) & a_{4,3} - \left(\frac{a_{4,0}}{a_{0,0}} \right) \cdot (a_{0,3}) & a_{4,4} - \left(\frac{a_{4,0}}{a_{0,0}} \right) \cdot (a_{0,4}) & a_{4,5} - \left(\frac{a_{4,0}}{a_{0,0}} \right) \cdot (a_{0,5}) \\ a_{5,0} - \left(\frac{a_{5,0}}{a_{0,0}} \right) \cdot (a_{0,0}) & a_{5,1} - \left(\frac{a_{5,0}}{a_{0,0}} \right) \cdot (a_{0,1}) & a_{5,2} - \left(\frac{a_{5,0}}{a_{0,0}} \right) \cdot (a_{0,2}) & a_{5,3} - \left(\frac{a_{5,0}}{a_{0,0}} \right) \cdot (a_{0,3}) & a_{5,4} - \left(\frac{a_{5,0}}{a_{0,0}} \right) \cdot (a_{0,4}) & a_{5,5} - \left(\frac{a_{5,0}}{a_{0,0}} \right) \cdot (a_{0,5}) \end{bmatrix} \quad b1 := \begin{bmatrix} b_0 \\ b_1 - \left(\frac{a_{1,0}}{a_{0,0}} \right) \cdot b_0 \\ b_2 - \left(\frac{a_{2,0}}{a_{0,0}} \right) \cdot b_0 \\ b_3 - \left(\frac{a_{3,0}}{a_{0,0}} \right) \cdot b_0 \\ b_4 - \left(\frac{a_{4,0}}{a_{0,0}} \right) \cdot b_0 \\ b_5 - \left(\frac{a_{5,0}}{a_{0,0}} \right) \cdot b_0 \end{bmatrix}$$

$$a1 = \begin{pmatrix} 2 & 2 & -4 & 2 & 6 & -2 \\ 0 & -6 & 10 & 0 & -10 & -2 \\ 0 & 4 & -2 & -4 & -2 & 4 \\ 0 & -6 & 18 & -12 & -26 & 12 \\ 0 & 4 & -8 & 12 & 20 & 0 \\ 0 & -2 & 18 & -20 & -30 & 4 \end{pmatrix} \quad b1 = \begin{pmatrix} 12 \\ 36 \\ -57 \\ -69 \\ 84 \\ -129 \end{pmatrix}$$

$$a2 := \begin{bmatrix} 2 & 2 & -4 & 2 & 6 & -2 \\ a1_{1,0} & a1_{1,1} & a1_{1,2} & a1_{1,3} & a1_{1,4} & a1_{1,5} \\ a1_{2,0} - \left(\frac{a1_{2,1}}{a1_{1,1}} \right) \cdot (a1_{1,0}) & a1_{2,1} - \left(\frac{a1_{2,1}}{a1_{1,1}} \right) \cdot (a1_{1,1}) & a1_{2,2} - \left(\frac{a1_{2,1}}{a1_{1,1}} \right) \cdot (a1_{1,2}) & a1_{2,3} - \left(\frac{a1_{2,1}}{a1_{1,1}} \right) \cdot (a1_{1,3}) & a1_{2,4} - \left(\frac{a1_{2,1}}{a1_{1,1}} \right) \cdot (a1_{1,4}) & a1_{2,5} - \left(\frac{a1_{2,1}}{a1_{1,1}} \right) \cdot (a1_{1,5}) \\ a1_{3,0} - \left(\frac{a1_{3,1}}{a1_{1,1}} \right) \cdot (a1_{1,0}) & a1_{3,1} - \left(\frac{a1_{3,1}}{a1_{1,1}} \right) \cdot (a1_{1,1}) & a1_{3,2} - \left(\frac{a1_{3,1}}{a1_{1,1}} \right) \cdot (a1_{1,2}) & a1_{3,3} - \left(\frac{a1_{3,1}}{a1_{1,1}} \right) \cdot (a1_{1,3}) & a1_{3,4} - \left(\frac{a1_{3,1}}{a1_{1,1}} \right) \cdot (a1_{1,4}) & a1_{3,5} - \left(\frac{a1_{3,1}}{a1_{1,1}} \right) \cdot (a1_{1,5}) \\ a1_{4,0} - \left(\frac{a1_{4,1}}{a1_{1,1}} \right) \cdot (a1_{1,0}) & a1_{4,1} - \left(\frac{a1_{4,1}}{a1_{1,1}} \right) \cdot (a1_{1,1}) & a1_{4,2} - \left(\frac{a1_{4,1}}{a1_{1,1}} \right) \cdot (a1_{1,2}) & a1_{4,3} - \left(\frac{a1_{4,1}}{a1_{1,1}} \right) \cdot (a1_{1,3}) & a1_{4,4} - \left(\frac{a1_{4,1}}{a1_{1,1}} \right) \cdot (a1_{1,4}) & a1_{4,5} - \left(\frac{a1_{4,1}}{a1_{1,1}} \right) \cdot (a1_{1,5}) \\ a1_{5,0} - \left(\frac{a1_{5,1}}{a1_{1,1}} \right) \cdot (a1_{1,0}) & a1_{5,1} - \left(\frac{a1_{5,1}}{a1_{1,1}} \right) \cdot (a1_{1,1}) & a1_{5,2} - \left(\frac{a1_{5,1}}{a1_{1,1}} \right) \cdot (a1_{1,2}) & a1_{5,3} - \left(\frac{a1_{5,1}}{a1_{1,1}} \right) \cdot (a1_{1,3}) & a1_{5,4} - \left(\frac{a1_{5,1}}{a1_{1,1}} \right) \cdot (a1_{1,4}) & a1_{5,5} - \left(\frac{a1_{5,1}}{a1_{1,1}} \right) \cdot (a1_{1,5}) \end{bmatrix} \quad b2 := \begin{bmatrix} b1_0 \\ b1_1 \\ b1_2 - \left(\frac{a1_{2,1}}{a1_{1,1}} \right) \cdot b1_1 \\ b1_3 - \left(\frac{a1_{3,1}}{a1_{1,1}} \right) \cdot b1_1 \\ b1_4 - \left(\frac{a1_{4,1}}{a1_{1,1}} \right) \cdot b1_1 \\ b1_5 - \left(\frac{a1_{5,1}}{a1_{1,1}} \right) \cdot b1_1 \end{bmatrix}$$

$$a^3 := \begin{bmatrix} 2 & 2 & -4 & 2 & 6 & -2 \\ a1_{1,0} & a1_{1,1} & a1_{1,2} & a1_{1,3} & a1_{1,4} & a1_{1,5} \\ a2_{2,0} & a2_{2,1} & a2_{2,2} & a2_{2,3} & a2_{2,4} & a2_{2,5} \\ a2_{3,0} - \left(\frac{a2_{3,2}}{a2_{2,2}} \right) \cdot (a2_{2,0}) & a2_{3,1} - \left(\frac{a2_{3,2}}{a2_{2,2}} \right) \cdot (a2_{2,1}) & a2_{3,2} - \left(\frac{a2_{3,2}}{a2_{2,2}} \right) \cdot (a2_{2,2}) & a2_{3,3} - \left(\frac{a2_{3,2}}{a2_{2,2}} \right) \cdot (a2_{2,3}) & a2_{3,4} - \frac{a2_{3,2}}{a2_{2,2}} \cdot (a2_{2,4}) & a2_{3,5} - \left(\frac{a2_{3,2}}{a2_{2,2}} \right) \cdot (a2_{2,5}) \\ a2_{4,0} - \left(\frac{a2_{4,2}}{a2_{2,2}} \right) \cdot (a2_{2,0}) & a2_{4,1} - \left(\frac{a2_{4,2}}{a2_{2,2}} \right) \cdot (a2_{2,1}) & a2_{4,2} - \left(\frac{a2_{4,2}}{a2_{2,2}} \right) \cdot (a2_{2,2}) & a2_{4,3} - \left(\frac{a2_{4,2}}{a2_{2,2}} \right) \cdot (a2_{2,3}) & a2_{4,4} - \left(\frac{a2_{4,2}}{a2_{2,2}} \right) \cdot (a2_{2,4}) & a2_{4,5} - \left(\frac{a2_{4,2}}{a2_{2,2}} \right) \cdot (a2_{2,5}) \\ a2_{5,0} - \left(\frac{a2_{5,2}}{a2_{2,2}} \right) \cdot (a2_{2,0}) & a2_{5,1} - \left(\frac{a2_{5,2}}{a2_{2,2}} \right) \cdot (a2_{2,1}) & a2_{5,2} - \left(\frac{a2_{5,2}}{a2_{2,2}} \right) \cdot (a2_{2,2}) & a2_{5,3} - \left(\frac{a2_{5,2}}{a2_{2,2}} \right) \cdot (a2_{2,3}) & a2_{5,4} - \left(\frac{a2_{5,2}}{a2_{2,2}} \right) \cdot (a2_{2,4}) & a2_{5,5} - \left(\frac{a2_{5,2}}{a2_{2,2}} \right) \cdot (a2_{2,5}) \end{bmatrix} b^3 := \begin{bmatrix} b2_0 \\ b2_1 \\ b2_2 \\ b2_3 - \left(\frac{a2_{3,2}}{a2_{2,2}} \right) \cdot b2_2 \\ b2_4 - \left(\frac{a2_{4,2}}{a2_{2,2}} \right) \cdot b2_2 \\ b2_5 - \left(\frac{a2_{5,2}}{a2_{2,2}} \right) \cdot b2_2 \end{bmatrix}$$

$$a^3 = \begin{pmatrix} 2 & 2 & -4 & 2 & 6 & -2 \\ 0 & -6 & 10 & 0 & -10 & -2 \\ 0 & 0 & 4.667 & -4 & -8.667 & 2.667 \\ 0 & 0 & 0 & -5.143 & -1.143 & 9.429 \\ 0 & 0 & 0 & 10.857 & 10.857 & -0.571 \\ 0 & 0 & 0 & -7.429 & 0.571 & -3.714 \end{pmatrix} = \begin{pmatrix} 12 \\ 36 \\ -33 \\ -48.429 \\ 98.571 \\ -37.286 \end{pmatrix}$$

$$\begin{array}{l}
a4 := \left[\begin{array}{cccccc}
2 & 2 & -4 & 2 & 6 & -2 \\
a_{1,0} & a_{1,1} & a_{1,2} & a_{1,3} & a_{1,4} & a_{1,5} \\
a_{2,0} & a_{2,1} & a_{2,2} & a_{2,3} & a_{2,4} & a_{2,5} \\
a_{3,0} & a_{3,1} & a_{3,2} & a_{3,3} & a_{3,4} & a_{3,5} \\
a_{4,0} - \left(\frac{a_{3,4,3}}{a_{3,3}} \right) \cdot (a_{3,0}) & a_{4,1} - \left(\frac{a_{3,4,3}}{a_{3,3}} \right) \cdot (a_{3,1}) & a_{4,2} - \left(\frac{a_{3,4,3}}{a_{3,3}} \right) \cdot (a_{3,2}) & a_{4,3} - \left(\frac{a_{3,4,3}}{a_{3,3}} \right) \cdot (a_{3,3}) & a_{4,4} - \left(\frac{a_{3,4,3}}{a_{3,3}} \right) \cdot (a_{3,4}) & a_{4,5} - \left(\frac{a_{3,4,3}}{a_{3,3}} \right) \cdot (a_{3,5}) \\
a_{5,0} - \left(\frac{a_{3,5,3}}{a_{3,3}} \right) \cdot (a_{3,0}) & a_{5,1} - \left(\frac{a_{3,5,3}}{a_{3,3}} \right) \cdot (a_{3,1}) & a_{5,2} - \left(\frac{a_{3,5,3}}{a_{3,3}} \right) \cdot (a_{3,2}) & a_{5,3} - \left(\frac{a_{3,5,3}}{a_{3,3}} \right) \cdot (a_{3,3}) & a_{5,4} - \left(\frac{a_{3,5,3}}{a_{3,3}} \right) \cdot (a_{3,4}) & a_{5,5} - \left(\frac{a_{3,5,3}}{a_{3,3}} \right) \cdot (a_{3,5})
\end{array} \right] \quad b4 := \left[\begin{array}{c}
b_{3,0} \\
b_{3,1} \\
b_{3,2} \\
b_{3,3} \\
b_{3,4} - \left(\frac{a_{3,4,3}}{a_{3,3}} \right) \cdot b_{3,3} \\
b_{3,5} - \left(\frac{a_{3,5,3}}{a_{3,3}} \right) \cdot b_{3,3}
\end{array} \right] \\
a4 = \left(\begin{array}{cccccc}
2 & 2 & -4 & 2 & 6 & -2 \\
0 & -6 & 10 & 0 & -10 & -2 \\
0 & 0 & 4.667 & -4 & -8.667 & 2.667 \\
0 & 0 & 0 & -5.143 & -1.143 & 9.429 \\
0 & 0 & 0 & 0 & 8.444 & 19.333 \\
0 & 0 & 0 & 0 & 2.222 & -17.333
\end{array} \right) \quad b4 = \left(\begin{array}{c}
12 \\
36 \\
-33 \\
-48.429 \\
-3.667 \\
32.667
\end{array} \right) \\
+
\end{array}$$

Activate Windows
Go to Settings to activate Windows.

$$\begin{array}{l}
a5 := \left[\begin{array}{cccccc}
2 & 2 & -4 & 2 & 6 & -2 \\
a_{1,0} & a_{1,1} & a_{1,2} & a_{1,3} & a_{1,4} & a_{1,5} \\
a_{2,0} & a_{2,1} & a_{2,2} & a_{2,3} & a_{2,4} & a_{2,5} \\
a_{3,0} & a_{3,1} & a_{3,2} & a_{3,3} & a_{3,4} & a_{3,5} \\
a_{4,0} & a_{4,1} & a_{4,2} & a_{4,3} & a_{4,4} & a_{4,5} \\
a_{5,0} - \left(\frac{a_{4,5,4}}{a_{4,4}} \right) \cdot (a_{4,0}) & a_{5,1} - \left(\frac{a_{4,5,4}}{a_{4,4}} \right) \cdot (a_{4,1}) & a_{5,2} - \left(\frac{a_{4,5,4}}{a_{4,4}} \right) \cdot (a_{4,2}) & a_{5,3} - \left(\frac{a_{4,5,4}}{a_{4,4}} \right) \cdot (a_{4,3}) & a_{5,4} - \left(\frac{a_{4,5,4}}{a_{4,4}} \right) \cdot (a_{4,4}) & a_{5,5} - \left(\frac{a_{4,5,4}}{a_{4,4}} \right) \cdot (a_{4,5})
\end{array} \right] \quad b5 := \left[\begin{array}{c}
b_{4,0} \\
b_{4,1} \\
b_{4,2} \\
b_{4,3} \\
b_{4,4} \\
b_{4,5} - \left(\frac{a_{4,5,4}}{a_{4,4}} \right) \cdot b_{4,4}
\end{array} \right] \\
a5 = \left(\begin{array}{cccccc}
2 & 2 & -4 & 2 & 6 & -2 \\
0 & -6 & 10 & 0 & -10 & -2 \\
0 & 0 & 4.667 & -4 & -8.667 & 2.667 \\
0 & 0 & 0 & -5.143 & -1.143 & 9.429 \\
0 & 0 & 0 & 0 & 8.444 & 19.333 \\
0 & 0 & 0 & 0 & 0 & -22.421
\end{array} \right) \quad b5 = \left(\begin{array}{c}
12 \\
36 \\
-33 \\
-48.429 \\
-3.667 \\
33.632
\end{array} \right) \\
+
\end{array}$$

Activate Windows
Go to Settings to activate Windows.

$$\begin{aligned}
T_5 &:= \frac{b\delta_5}{a\delta_{5,5}} \quad T_5 = -1.5 \\
T_4 &:= \frac{b\delta_4 - (a\delta_{4,5}T_5)}{a\delta_{4,4}} \quad T_4 = 3 \\
T_3 &:= \frac{b\delta_3 - (a\delta_{3,5}T_5) - (a\delta_{3,4} \cdot T_4)}{a\delta_{3,3}} \quad T_3 = 6 \\
T_2 &:= \frac{b\delta_2 - (a\delta_{2,5}T_5) - (a\delta_{2,4} \cdot T_4) - (a\delta_{2,3} \cdot T_3)}{a\delta_{2,2}} \quad T_2 = 4.5 \\
T_1 &:= \frac{b\delta_1 - (a\delta_{1,5}T_5) - (a\delta_{1,4} \cdot T_4) - (a\delta_{1,3} \cdot T_3) - (a\delta_{1,2} \cdot T_2)}{a\delta_{1,1}} \quad T_1 = -3 \\
T_0 &:= \frac{b\delta_0 - (a\delta_{0,5}T_5) - (a\delta_{0,4} \cdot T_4) - (a\delta_{0,3} \cdot T_3) - (a\delta_{0,2} \cdot T_2) - (a\delta_{0,1} \cdot T_1)}{a\delta_{0,0}} \quad T_0 = 1.5
\end{aligned}$$

$$T = \begin{pmatrix} 1.5 \\ -3 \\ 4.5 \\ 6 \\ 3 \\ -1.5 \end{pmatrix}$$

+