

Small Circuits  
 matrices elements  
 fundamental mathematics  
 10/10/2020

Assignment 3 solution

$$\begin{aligned} T_1 + T_3 - 2T_2 + T_4 + 3T_5 - T_6 &= 4 \\ 2T_1 - T_2 + T_3 + 2T_4 + T_5 - 3T_6 &= 20 \\ T_1 + 3T_2 - 3T_3 - T_4 + 2T_5 + T_6 &= -15 \\ 5T_1 + 2T_2 - T_3 - T_4 + 2T_5 + T_6 &= -3 \\ -5T_1 - T_2 - 2T_3 + 3T_4 + T_5 + 3T_6 &= 16 \\ 4T_1 + 3T_2 + T_3 - 6T_4 - 3T_5 - 2T_6 &= -27 \end{aligned}$$

After Picking

$$\begin{aligned} 5T_1 + 2T_2 - T_3 - T_4 + 2T_5 + T_6 &= -3 \\ 4T_1 + 3T_2 + T_3 - 6T_4 - 3T_5 - 2T_6 &= -27 \\ 2T_1 - T_2 + T_3 + 2T_4 + T_5 - 3T_6 &= 20 \\ T_1 + T_2 - 2T_3 + T_4 + 3T_5 - T_6 &= 4 \\ -5T_1 + 3T_2 - 3T_3 - T_4 + 2T_5 + T_6 &= -15 \\ -5T_1 - T_2 - 2T_3 + 3T_4 + T_5 + 3T_6 &= 16 \end{aligned}$$

$$\frac{4}{5} \times \text{equ(1)}: 4T_1 + \frac{8}{5}T_2 - \frac{4}{5}T_3 - \frac{4}{5}T_4 + \frac{8}{5}T_5 + \frac{4}{5}T_6 = -\frac{12}{5}$$

$$\frac{2}{5} \times \text{equ(2)}: 2T_1 + \frac{4}{5}T_2 + \frac{2}{5}T_3 - \frac{2}{5}T_4 + \frac{4}{5}T_5 + \frac{2}{5}T_6 = -\frac{6}{5}$$

$$\frac{1}{5} \times \text{equ(3)}: T_1 + \frac{2}{5}T_2 - \frac{1}{5}T_3 + \frac{1}{5}T_4 + \frac{2}{5}T_5 + \frac{1}{5}T_6 = -\frac{3}{5}$$

$$eqn(0) = \frac{1}{5} + T_1 + \frac{2T_2}{5} + \frac{T_3}{5} - \frac{T_4}{5} + \frac{2T_5}{5} + \frac{T_6}{5} = -\frac{3}{5}$$

$$eqn(1) = \frac{3}{5} + T_1 - \frac{6}{5} T_2 + \frac{3T_3}{5} + \frac{3T_4}{5} - \frac{1}{5} T_5 - \frac{3}{5} T_6 = -\frac{7}{5}$$

$$eqn(2) - eqn(1) : 0 + \frac{7}{5} T_2 + \frac{9}{5} T_3 - \frac{2T_4}{5} - \frac{23}{5} T_5 - \frac{14}{5} T_6 = -\frac{123}{5}$$

$$eqn(3) - eqn(2) : 0 - \frac{9}{5} T_2 + \frac{7}{5} T_3 + \frac{12}{5} T_4 + \frac{1}{5} T_5 - \frac{17}{5} T_6 = \frac{94}{5}$$

$$eqn(4) - eqn(3) : 0 + \frac{3}{5} T_2 + \frac{9}{5} T_3 + \frac{6}{5} T_4 + \frac{13}{5} T_5 - \frac{6}{5} T_6 = \frac{23}{5}$$

$$eqn(5) - eqn(4) : 0 + \frac{13}{5} T_2 - \frac{14}{5} T_3 - \frac{4}{5} T_4 + \frac{8}{5} T_5 + \frac{4}{5} T_6 = -\frac{72}{5}$$

$$eqn(6) - eqn(5) : 0 + \frac{1}{5} T_2 + \frac{7}{5} T_3 + \frac{12}{5} T_4 + \frac{11}{5} T_5 + \frac{18}{5} T_6 = \frac{89}{5}$$

$$eqn(2) \times \frac{9}{7} : -\frac{9}{7} T_2 - \frac{81}{35} T_3 + \frac{234}{35} T_4 + \frac{201}{35} T_5 + \frac{18T_6}{5} = -\frac{1109}{35}$$

$$eqn(2) \times \frac{3}{7} : \frac{3}{7} T_2 + \frac{27}{35} T_3 - \frac{78}{35} T_4 + \frac{69}{35} T_5 - \frac{6}{5} T_6 = -\frac{369}{35}$$

$$eqn(2) \times \frac{13}{7} : \frac{13}{7} T_2 + \frac{117}{35} T_3 - \frac{338}{35} T_4 - \frac{299}{35} T_5 - \frac{26}{5} T_6 = -\frac{1599}{35}$$

$$eqn(2) \times \frac{1}{7} : \frac{1}{7} T_2 + \frac{9}{35} T_3 - \frac{26}{35} T_4 - \frac{23}{35} T_5 - \frac{2}{5} T_6 = -\frac{123}{35}$$

$$eqn(14) - eqn(13): 0 + \frac{76}{7} T_3 - \frac{30}{7} T_4 - \frac{40}{7} T_5 + \frac{1}{6} T_6 = \frac{449}{35} \quad - (1)$$

$$eqn(14) - eqn(18): 0 - \frac{18}{7} T_3 + \frac{24}{7} T_4 + \frac{22}{7} T_5 + 0 = \frac{106}{7} \quad - (2)$$

$$eqn(15) - eqn(17): 0 - \frac{43}{7} T_3 + \frac{62}{7} T_4 + \frac{21}{7} T_5 + 6 T_6 = \frac{619}{7} \quad - (3)$$

$$eqn(16) - eqn(20): 0 + \frac{2}{7} T_3 + \frac{27}{7} T_4 + \frac{20}{7} T_5 + 4 T_6 = \frac{746}{35} \quad - (4)$$

$$eqn(21) \times \frac{9}{13}: -\frac{18}{7} T_3 + \frac{270}{91} T_4 + \frac{360}{91} T_5 + \frac{9}{65} T_6 = \frac{4041}{455} \quad - (5)$$

$$eqn(21) \times \frac{43}{26}: -\frac{43}{7} T_3 + \frac{645}{91} T_4 + \frac{860}{91} T_5 + \frac{43}{130} T_6 = \frac{19307}{910} \quad - (6)$$

$$eqn(21) \times \frac{4}{13}: \frac{8}{7} T_3 - \frac{120}{91} T_4 - \frac{160}{91} T_5 - \frac{4}{65} T_6 = -\frac{1976}{455} \quad - (7)$$

$$eqn(22) - eqn(25): 0 + \frac{6}{13} T_4 + \frac{8}{13} T_5 - \frac{9}{65} T_6 = \frac{407}{65} \quad - (8)$$

$$eqn(23) - eqn(26): 0 + \frac{23}{13} T_4 + \frac{9}{13} T_5 + \frac{737}{130} T_6 = \frac{1309}{130} \quad - (9)$$

$$eqn(24) - eqn(27): 0 + \frac{58}{13} T_4 + \frac{60}{13} T_5 + \frac{264}{65} T_6 = \frac{1642}{65} \quad - (10)$$

$$\text{eqn (28)} \times \frac{21}{6} : \frac{23}{13} T_4 + \frac{92}{51} T_5 - \frac{67}{150} T_6 = \frac{9361}{510}$$

$$\text{eqn (29)} \times \frac{27}{3} : \frac{68}{13} T_4 + \frac{232}{51} T_5 - \frac{82}{65} T_6 = \frac{11803}{195}$$

$$\text{eqn (27)} - \text{eqn (31)} : 0 - \frac{5}{3} T_5 + \frac{31}{5} T_6 = -\frac{201}{15}$$

$$\text{eqn (30)} - \text{eqn (32)} : 0 - \frac{4}{3} T_5 + \frac{27}{5} T_6 = -\frac{529}{15}$$

$$\text{eqn (33)} \times \frac{4}{5} : -\frac{4}{3} T_5 + \frac{124}{25} T_6 = -\frac{836}{75} \quad (35)$$

$$\text{eqn (34)} - \text{eqn (35)} = 0 + \frac{11}{25} T_6 = -\frac{694}{15} - \frac{603}{25}$$

$$\therefore 5T_1 + 2T_2 - T_3 - T_4 + 2T_5 + T_6 = -3$$

$$\frac{7}{5} T_2 + \frac{9}{5} T_3 - \frac{26}{5} T_4 - \frac{23}{5} T_5 - \frac{14}{5} T_6 = -\frac{123}{5}$$

$$\frac{26}{7} T_3 - \frac{30}{7} T_4 - \frac{40}{7} T_5 - \frac{1}{5} T_6 = -\frac{449}{35}$$

$$\frac{6}{13} T_4 + \frac{8}{13} T_5 - \frac{7}{65} T_6 = \frac{407}{65}$$

$$-\frac{5}{3} T_5 + \frac{31}{5} T_6 = -\frac{201}{15}$$

$$\frac{11}{25} T_6 = -\frac{694}{15} - \frac{603}{25}$$

$$T_6 = \frac{-603}{25} \times \frac{25}{11}$$

$$T_6 = \frac{-603}{11}$$

$$T_6 = -54.82$$

$$\frac{-5}{3} T_5 + \frac{31}{5} T_6 = \frac{-209}{15}$$

$$\frac{-5}{3} T_5 = \frac{-209}{15} - \frac{31}{5} (-54.82)$$

$$\frac{-5}{3} T_5 = 325.951$$

$$T_5 = -195.5704$$

$$\frac{6}{13} T_4 + \frac{8}{13} T_5 - \frac{9}{65} T_6 = \frac{407}{65}$$

$$\frac{6}{13} T_4 + \frac{8}{13} (-195.5704) - \frac{9}{65} (-54.82) = \frac{407}{65}$$

$$\frac{6}{13} T_4 - 120.3510 + 7.5905 = \frac{407}{65}$$

$$\frac{6}{13} T_4 = 119.0220$$

$$T_4 = -257.8811$$

$$\frac{26}{7} T_3 - \frac{30}{7} T_4 - \frac{40}{7} T_5 - \frac{1}{5} T_6 = \frac{-449}{35}$$

$$\frac{26}{7} T_3 - \frac{30}{7} (-257.8811) - \frac{40}{7} (-195.5704) - \frac{1}{5} (-54.82) = \frac{-449}{35}$$

$$\frac{26}{7} T_3 - 1105.204714 + 1117.545143 + 10.964 = \frac{-449}{35}$$

$$\frac{26}{7} T_3 = -36.133$$

$$T_3 = -9.7281$$

$$\frac{7}{5}T_1 + \frac{9}{5}T_2 - \frac{26}{5}T_4 - \frac{23}{5}T_5 - \frac{14}{5}T_6 = \frac{-123}{5}$$

$$\frac{7}{5}T_1 = \frac{-123}{5} - \frac{9}{5}(-9.7281) + \frac{26}{5}(257.8811) + \frac{23}{5}(-195.5704)$$

$$+ \frac{14}{5}(-54.82)$$

5

$$\frac{7}{5}T_1 = 280.77246$$

5

$$T_1 = 200.5518$$

$$5T_1 + 2T_2 - T_3 - T_4 + 2T_5 + T_6 = -3$$

$$5T_1 = -3 - 2(200.5518) + (-9.7281) + (257.8811) - 2(-195.5704) - (-54.82)$$

$$5T_1 = 290.0102$$

$$T_1 = 58.00204$$