

Osamjintyji Olumotobi Deborah.

15/ENG06/059

Mechanical Engineering.

ENG 382.

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

Solution

$$\begin{bmatrix} 1 & 1 & -2 & 1 & 3 & -1 \\ 2 & -1 & 1 & 2 & 1 & -3 \\ 1 & 3 & -3 & -1 & 2 & 1 \\ 5 & 2 & -1 & -1 & 2 & 1 \\ -3 & -1 & 2 & 3 & 1 & 3 \\ 4 & 3 & 1 & -6 & -3 & -2 \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \\ T_5 \\ T_6 \end{bmatrix} = \begin{bmatrix} 4 \\ 20 \\ -15 \\ -3 \\ 16 \\ -27 \end{bmatrix}$$

$$\left[ \begin{array}{cccccc|c} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ 2 & -1 & 1 & 2 & 1 & -3 & 20 \\ 1 & 3 & -3 & -1 & 2 & 1 & -15 \\ 5 & 2 & -1 & -1 & 2 & 1 & -3 \\ -3 & -1 & 2 & 3 & 1 & 3 & 16 \\ 4 & 3 & 1 & -6 & -3 & -2 & -27 \end{array} \right]$$

$$\frac{a_{21}}{a_{11}} = \frac{2}{1} = 2, \frac{a_{31}}{a_{11}} = \frac{1}{1} = 1, \frac{a_{41}}{a_{11}} = \frac{5}{1} = 5, \frac{a_{51}}{a_{11}} = \frac{-3}{1} = -3, \frac{a_{61}}{a_{11}} = \frac{4}{1} = 4$$

$$\left\{ \begin{array}{cccccc|c} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ 0-2(1) & 1-2(1) & -2-2(-2) & 1-2(1) & 3-2(1) & -1-2(-1) & \\ & & & & & & \\ & & & & & & \\ & & & & & & \\ & & & & & & \end{array} \right\}$$

$$\left\{ \begin{array}{cccccc|c} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ 2-2(1) & -1-2(1) & 1-2(-2) & 2-2(1) & 1-2(3) & -3-2(-1) & 20-2(4) \\ 1-1(1) & 3-1(1) & -3-1(-2) & -1-1(1) & 2-1(3) & 1-1(-1) & -15-1(4) \\ 5-5(1) & 2-5(1) & -1-5(-2) & -1-5(1) & 2-5(3) & 1-5(-1) & -3-5(4) \\ -3-(-3)(1) & -1-(-3)(1) & 2-(-3)(-2) & 3-(-3)(1) & 1-(-3)(3) & 3-(-3)(-1) & 16-(-3)(4) \\ 4-4(1) & 3-4(1) & 1-4(-2) & 6-4(-2) & -3-4(3) & -2-4(-1) & -27-4(4) \end{array} \right\}$$

$$\left\{ \begin{array}{cccccc|c} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ 0 & -3 & 5 & 0 & -7 & -1 & 12 \\ 0 & 2 & -1 & -2 & -1 & 2 & -19 \\ 0 & -3 & 9 & -6 & -13 & 6 & -23 \\ 0 & 2 & -4 & 6 & 10 & 0 & 28 \\ 0 & -1 & 9 & 14 & -15 & 2 & -43 \end{array} \right\}$$

$$\left\{ \begin{array}{cccccc|c} 1 & 1 & -2 & 1 & 3 & -1 & 4 \\ 0 & -3 & 5 & 0 & -7 & -1 & 12 \\ 0 & 2 & -1 & -2 & -1 & 2 & -19 \\ 0 & -3 & 9 & -6 & -13 & 6 & -23 \\ 0 & 2 & -4 & 6 & 10 & 0 & 28 \\ 0 & -1 & 9 & 14 & -15 & 2 & -43 \end{array} \right\}$$

$$\begin{bmatrix} 1 & 1 & -2 & 1 \\ 0 & -3 & 5 & 0 \\ 0 & 0 & 2-33 & 2 \\ 0 & 0 & 4-\frac{4}{2-33} (2-33), -6-\left[\frac{4}{2-33}\right] \\ 0 & 0 & -0.667-\left[\frac{-0.667+2-333}{2-33}\right] & 6-\left[\frac{-0.667x-2}{2-33}\right] \\ 0 & 0 & 7-533-\left[\frac{7-333x2-33}{2-33}\right] & -10-\left[\frac{7-333x-2}{2-33}\right] \end{bmatrix}$$

$$\left[ \begin{array}{cccccccc} 1 & 1 & -2 & 1 & 1 & 3 & -1 & 4 \\ 0 & -3 & 5 & 0 & -5 & -1 & & 12 \\ 0 & 0 & 2.333 & -2 & 4.333 & 1.333 & & -11 \\ 0 & 0 & 0 & -2.571 & -0.571 & 8.714 & & -16.142 \\ 0 & 0 & 0 & 5.428 & 5.428 & -0.285 & & 32.857 \\ 0 & 0 & 0 & -3.714 & 0.285 & -1.857 & & -12.428 \end{array} \right]$$

[illegible]

$$= \begin{cases} \begin{cases} -1 & 4 \\ -1 & -12 \\ 1.3323 & -11 \\ 4.714 & -16.142 \\ -0.285 - \frac{5.428}{-2.571} (4.714) & 32.857 - \frac{5.428}{-2.571} (-16.142) \\ 1.857 - \frac{(-3.714)}{-2.571} (4.714) & -12.428 - \frac{(-3.714)}{-2.571} (-16.142) \end{cases} \end{cases}$$

$$= \begin{cases} \begin{cases} 1, 1, -2, 1, 3, -1 & 4 \\ 0, -3, 5, 0, -5, -1 & 12 \\ 0, 0, 2.333, -2, -4.333, 1.333 & -11 \\ 0, 0, 0, -2.571, 4.714, -16.142 & \\ 0, 0, 0, 0, 4.222, 9.667, -1.222 & \\ 0, 0, 0, 0, 1.111, -8.667, 10.889 & \end{cases} \end{cases}$$

$$\begin{cases} \begin{cases} 1, 1, -2, 1, 3, -1 & 4 \\ 0, -3, 5, 0, -5, -1 & 12 \\ 0, 0, 2.333, -2, -4.333, 1.333 & -11 \\ 0, 0, 0, -2.571, 4.714, -16.142 & \\ 0, 0, 0, 0, 4.222, 9.667, -1.222 & \\ 0, 0, 0, 0, 1.111, -8.667, 10.889 & \end{cases} \end{cases}$$

$$\begin{cases} \begin{cases} 1, 1, -2, 1, 3, -1 & T_1 \\ 0, -3, 5, 0, -5, -1 & T_2 \\ 0, 0, 2.333, -2, -4.333, 1.333 & T_3 \\ 0, 0, 0, -2.571, 4.714, -16.142 & T_4 \\ 0, 0, 0, 0, 4.222, 9.667, -1.222 & T_5 \\ 0, 0, 0, 0, 1.111, -8.667, 10.889 & T_6 \end{cases} \end{cases}$$

$$T_6 = \frac{11.210}{-11.210} = -1$$

$$T_5 = \frac{(1.222 - 9.667 \times T_6)}{4.222} = \frac{(1.222 - 9.667 \times -1)}{4.222}$$

$$T_4 = \frac{(-16.142 + 0.57193 \times T_5 + 4.714 \times T_6)}{-2.571} = \frac{-16.142 + 0.57193 \times 2 + 4.714 \times -1}{-2.571}$$

$$= \underline{\underline{4}}$$

$$T_3 = \frac{(-11 + 2 \times T_4 + 4.333 \times T_5 - 1.333 \times T_6)}{-2.333} = \frac{-11 + 2 \times 4 + 4.333 \times 2 - 1.333 \times -1}{-2.333}$$

$$= \underline{\underline{3}}$$

$$T_2 = \frac{12 - 5 \times T_3 - 0 \times T_4 + 5 \times T_5 + 1 \times T_6}{-3} = \frac{12 - 5 \times 3 - 0 + 5 \times 2 + 1 \times -1}{-3}$$

$$= \underline{\underline{-2}}$$

$$T_1 = \frac{4 - 1 \times T_2 + 2 \times T_3 - 1 \times T_4 - 3 \times T_5 + 1 \times T_6}{1}$$

$$= \frac{4 - 1 \times -2 + 2 \times 3 - 1 \times 4 - 3 \times 2 + 1 \times -1}{1} = \underline{\underline{1}}$$