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16/Eng01/019

Chemical Eng

Eng 382 Assignment 4

Given:

$$10m_1 + 2m_2 + m_3 = 9$$

$$-2m_1 + 10m_2 + 2m_3 = 12$$

$$-2m_1 - 5m_2 + 10m_3 = 18$$

Solution

$$m_1 = m_2 = m_3 = 0$$

$$\begin{bmatrix} 10 \\ -2 \\ -2 \end{bmatrix} \begin{matrix} A \\ \\ \\ \end{matrix} \begin{bmatrix} 10 & -2 & 1 \\ -2 & 10 & -2 \\ -2 & -5 & 10 \end{bmatrix} \begin{matrix} \oplus \\ \\ \\ \end{matrix} \begin{bmatrix} m_1 \\ m_2 \\ m_3 \end{bmatrix} = \begin{matrix} c \\ \\ \\ \end{matrix} \begin{bmatrix} 9 \\ 12 \\ 18 \end{bmatrix}$$

$$m_{i+1} = \frac{1}{10} \times A$$
$$= \begin{bmatrix} 0 & 0.2 & -0.1 \\ 0.2 & 1.0 & 0.2 \\ 0.2 & 0.5 & 0 \end{bmatrix} \begin{bmatrix} m_1 \\ m_2 \\ m_3 \end{bmatrix} + \begin{bmatrix} 0.9 \\ 1.2 \\ 1.8 \end{bmatrix}$$

$$m_1 = m_2 = m_3 = 0$$
$$= \begin{bmatrix} 0 & 0.2 & -0.1 \\ 0.2 & 0 & 0.2 \\ 0.2 & 0.5 & 0 \end{bmatrix} \begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix} + \begin{bmatrix} 0.9 \\ 1.2 \\ 1.8 \end{bmatrix} = \begin{bmatrix} 0.9 \\ 1.2 \\ 1.8 \end{bmatrix}$$

$$\begin{bmatrix} m_1 \\ m_2 \\ m_3 \end{bmatrix} = \begin{bmatrix} 0 & 0.2 & -0.1 \\ 0.2 & 0 & 0.2 \\ 0.2 & 0.5 & 0 \end{bmatrix} \begin{bmatrix} 0.9 \\ 1.2 \\ 1.8 \end{bmatrix} + \begin{bmatrix} 0.9 \\ 1.2 \\ 1.8 \end{bmatrix} = \begin{bmatrix} 0.96 \\ 1.74 \\ 2.58 \end{bmatrix}$$

$$\begin{bmatrix} m_1 \\ m_2 \\ m_3 \end{bmatrix} = \begin{bmatrix} 0 & 0.2 & -0.1 \\ 0.2 & 0 & 0.2 \\ 0.2 & 0.5 & 0 \end{bmatrix} \begin{bmatrix} 0.96 \\ 1.74 \\ 2.58 \end{bmatrix} + \begin{bmatrix} 0.9 \\ 1.2 \\ 1.8 \end{bmatrix} = \begin{bmatrix} 0.99 \\ 1.908 \\ 2.862 \end{bmatrix}$$