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16/ENG 07/018.

PETROLEUM ENGR.

ENG 382

ASSIGNMENT 4

Using an initial guess vector of  $m_0 = [0; 0; 0]$   
Applying Jacobi iterative method

$$10m_1 - 2m_2 + m_3 = 9 \quad \text{--- (i)}$$

$$-2m_1 + 10m_2 - 2m_3 = 12 \quad \text{--- (ii)}$$

$$-2m_1 - 5m_2 + 10m_3 = 18 \quad \text{--- (iii)}$$

From eqn (i), making  $m_1$  the subject of the formula

$$m_1 = \frac{2m_2}{10} - \frac{m_3}{10} + \frac{9}{10} = 0.2m_2 - 0.1m_3 + 0.9$$

From eqn (ii), making  $m_2$  the subject of the formula

$$m_2 = \frac{2m_1}{10} + \frac{2m_3}{10} + \frac{12}{10} = 0.2m_1 + 0.2m_3 + 1.2$$

From eqn (iii), making  $m_3$  the subject of the formula

$$m_3 = \frac{2m_1}{10} + \frac{5m_2}{10} + \frac{18}{10} = 0.2m_1 + 0.5m_2 + 1.8$$

$$\text{From, } m_1 = 0.2(0) - 0.1(0) + 0.9 = 0.9$$

$$m_2 = 0.2(0) + 0.2(0) + 1.2 = 1.2$$

$$m_3 = 0.2(0) + 0.5(0) + 1.8 = 1.8$$

Substitute ~~eq~~ back 0.9, 1.2 and 1.8

$$m_1 = 0.2(1.2) - 0.1(1.8) + 0.9 = 0.96$$

$$m_2 = 0.2(0.9) + 0.2(1.8) + 1.2 = 1.74$$

$$m_3 = 0.2(0.9) + 0.5(1.2) + 1.8 = 2.58$$

Substitute back 0.96, 1.74 and 2.58

$$m_1 = 0.2(1.74) - 0.1(2.58) + 0.9 = 0.99$$

$$m_2 = 0.2(0.96) + 0.2(2.58) + 1.2 = 1.908$$

$$m_3 = 0.2(0.96) + 0.5(1.74) + 1.8 = 2.862$$

Substitute back 0.99, 1.908 and 2.862

$$m_1 = 0.2(1.908) - 0.1(2.862) + 0.9 = 0.9954$$

$$m_2 = 0.2(0.99) + 0.2(2.862) + 1.2 = 1.9704$$

$$m_3 = 0.2(0.99) + 0.5(1.908) + 1.8 = 2.952$$