

Given Using Eq. 24 to 31 in this file for finding coefficients of the equations

Coefficient of gradient of theta set to zero

$$\frac{ro \cdot \Delta\theta}{ro} A - \frac{ro \cdot \Delta\theta}{ro} B + \left( \frac{2ro \Delta\theta}{ro} \right) \cdot C - \left( \frac{2 \cdot ro \cdot \Delta\theta}{ro} \right) D = 0$$

Similarly setting the coefficient of second order derivative of theta to  $1/ro^2$

$$\frac{(ro \cdot \Delta\theta)^2}{ro^2 2!} \cdot A + \frac{(ro \cdot \Delta\theta)^2}{ro^2 2!} \cdot B + \frac{(2 \cdot ro \cdot \Delta\theta)^2}{ro^2 2!} \cdot C + \frac{(2 \cdot ro \cdot \Delta\theta)^2}{ro^2 2!} \cdot D = \frac{1}{ro^2}$$

Setting the coefficient of third order derivative of theta to zero

$$\frac{(ro \cdot \Delta\theta)^3}{ro^3 3!} \cdot A - \frac{(ro \cdot \Delta\theta)^3}{ro^3 3!} \cdot B + \frac{(2 \cdot ro \cdot \Delta\theta)^3}{ro^3 3!} \cdot C - \frac{(2 \cdot ro \cdot \Delta\theta)^3}{ro^3 3!} \cdot D = 0$$

Similarly setting the coefficient of fourth order derivative of theta to zero

$$\frac{(ro \cdot \Delta\theta)^4}{ro^4 4!} \cdot A + \frac{(ro \cdot \Delta\theta)^4}{ro^4 4!} \cdot B + \frac{(2 \cdot ro \cdot \Delta\theta)^4}{ro^4 4!} \cdot C + \frac{(2 \cdot ro \cdot \Delta\theta)^4}{ro^4 4!} \cdot D = 0$$

$$\text{Find}(A, B, C, D) \rightarrow \begin{pmatrix} \frac{4}{3 \cdot ro^2 \cdot \Delta\theta^2} \\ \frac{4}{3 \cdot ro^2 \cdot \Delta\theta^2} \\ -1 \\ \frac{-1}{12 \cdot ro^2 \cdot \Delta\theta^2} \\ -1 \\ \frac{-1}{12 \cdot ro^2 \cdot \Delta\theta^2} \end{pmatrix}$$

Given

Setting the coefficient of gradient of T with r to  $1/r_0$

$$E \cdot \Delta r - F \cdot \Delta r + G \cdot 2\Delta r - H \cdot 2 \cdot \Delta r = \frac{1}{r_0}$$

Setting the coefficient of second order derivative T with r to 1

$$E \cdot \frac{\Delta r^2}{2!} + F \cdot \frac{\Delta r^2}{2!} + G \cdot \frac{(2\Delta r)^2}{2!} + H \cdot \frac{(2\Delta r)^2}{2!} = 1$$

Setting the coefficient of third order derivative of T with r to 0

$$E \cdot \frac{\Delta r^3}{3!} - F \cdot \frac{\Delta r^3}{3!} + G \cdot \frac{(2\Delta r)^3}{3!} - H \cdot \frac{(2\Delta r)^3}{3!} = 0$$

Setting the coefficient of fourth order derivative of T with r to 0

$$E \cdot \frac{\Delta r^4}{4!} + F \cdot \frac{\Delta r^4}{4!} + G \cdot \frac{(2\Delta r)^4}{4!} + H \cdot \frac{(2\Delta r)^4}{4!} = 0$$

$$\text{Find}(E, F, G, H) \rightarrow \begin{pmatrix} \frac{2}{3} \cdot \frac{2 \cdot r_0 + \Delta r}{\Delta r^2 \cdot r_0} \\ \frac{2}{3} \cdot \frac{2 \cdot r_0 - \Delta r}{\Delta r^2 \cdot r_0} \\ \frac{-1}{12} \cdot \frac{r_0 + \Delta r}{\Delta r^2 \cdot r_0} \\ \frac{-1}{12} \cdot \frac{r_0 - \Delta r}{\Delta r^2 \cdot r_0} \end{pmatrix}$$