Part 3

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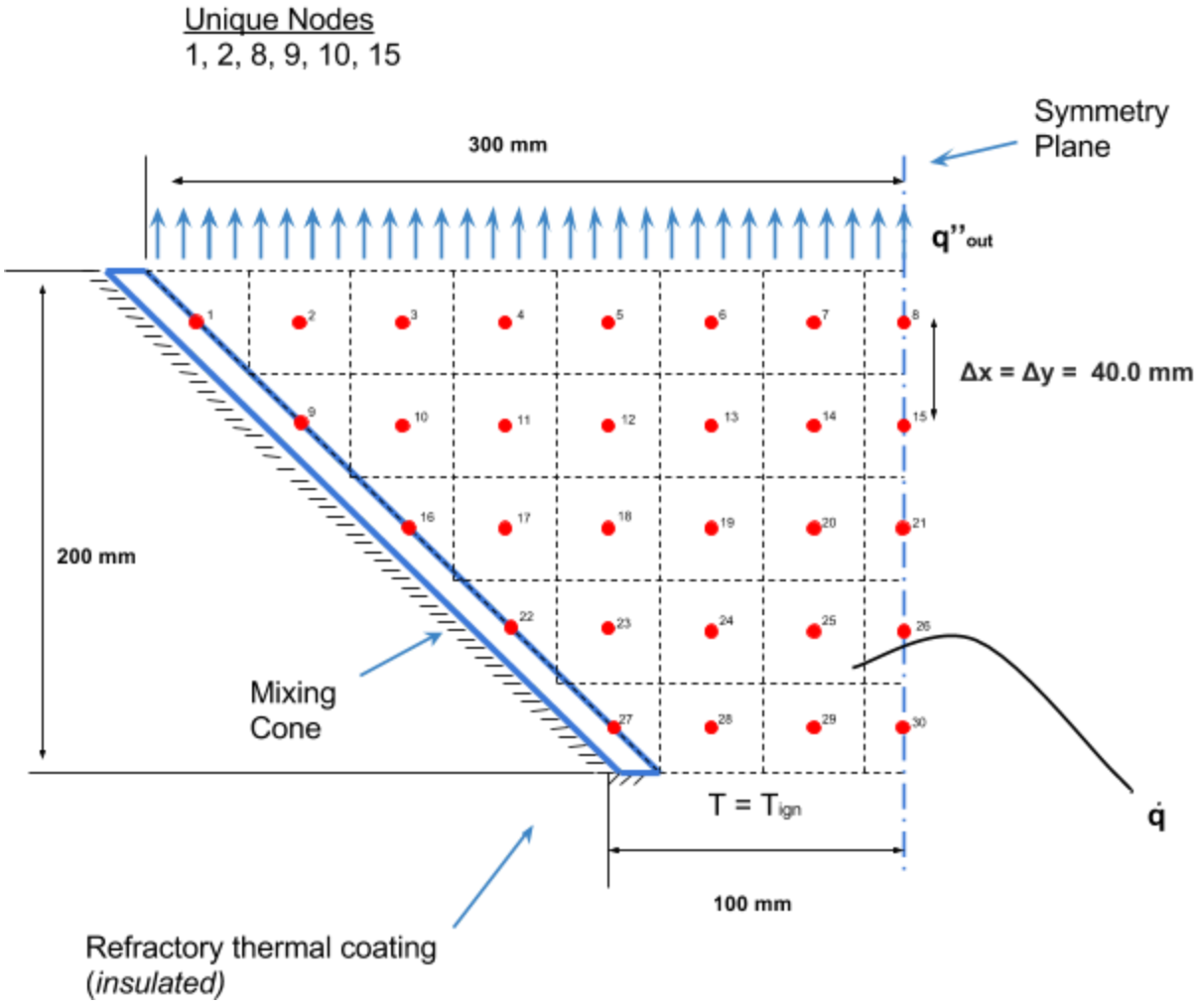
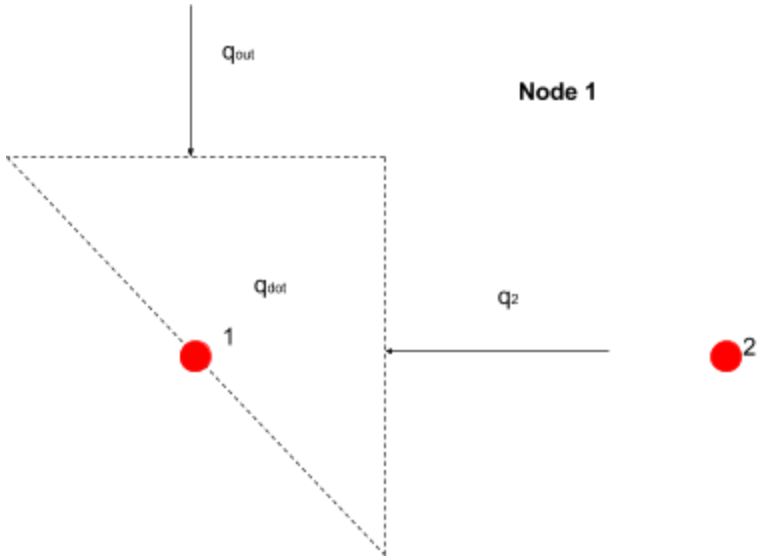
Reference Diagram





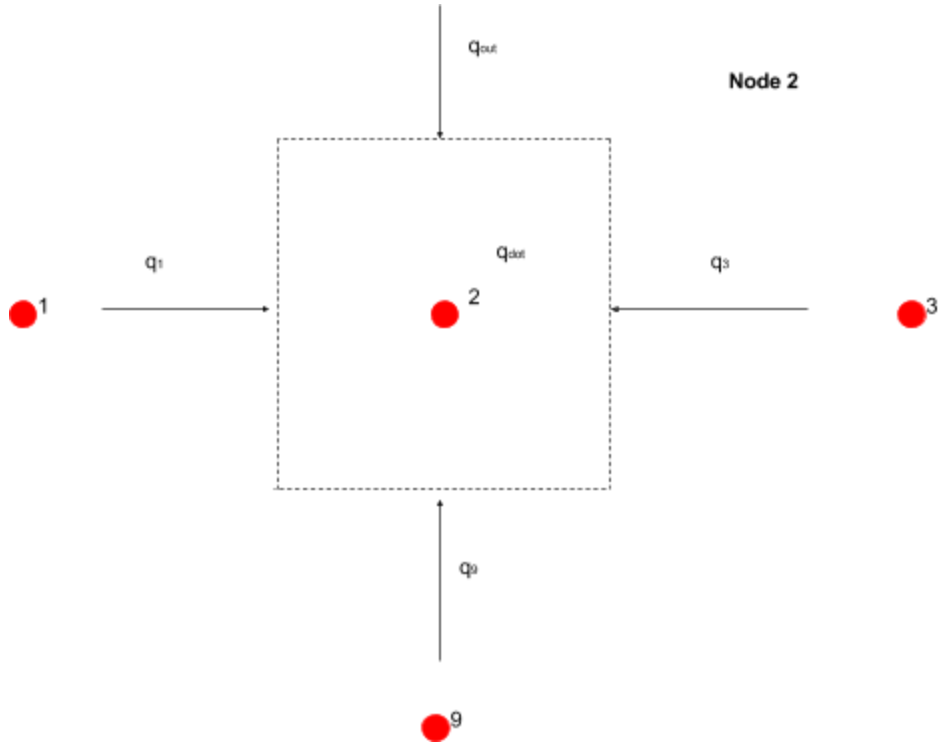
$$\dot{E_{in}} - \dot{E_o} + \dot{E_g} = \dot{E_{st}}$$

$$\dot{E_{in}} = -\dot{E_g}$$

$$q_2 + q_{out} = -\frac{\dot{q}\cancel{V}}{2}$$

$$\frac{k\Delta y}{\Delta x}(T_2 - T_1) + q''_{out}\Delta x = -\frac{\dot{q}\Delta x^2}{2}$$

$$\boxed{-T_1 + T_2 = -\frac{\Delta x}{k}\left(q''_{out} + \frac{\dot{q}\Delta x}{2}\right)}$$



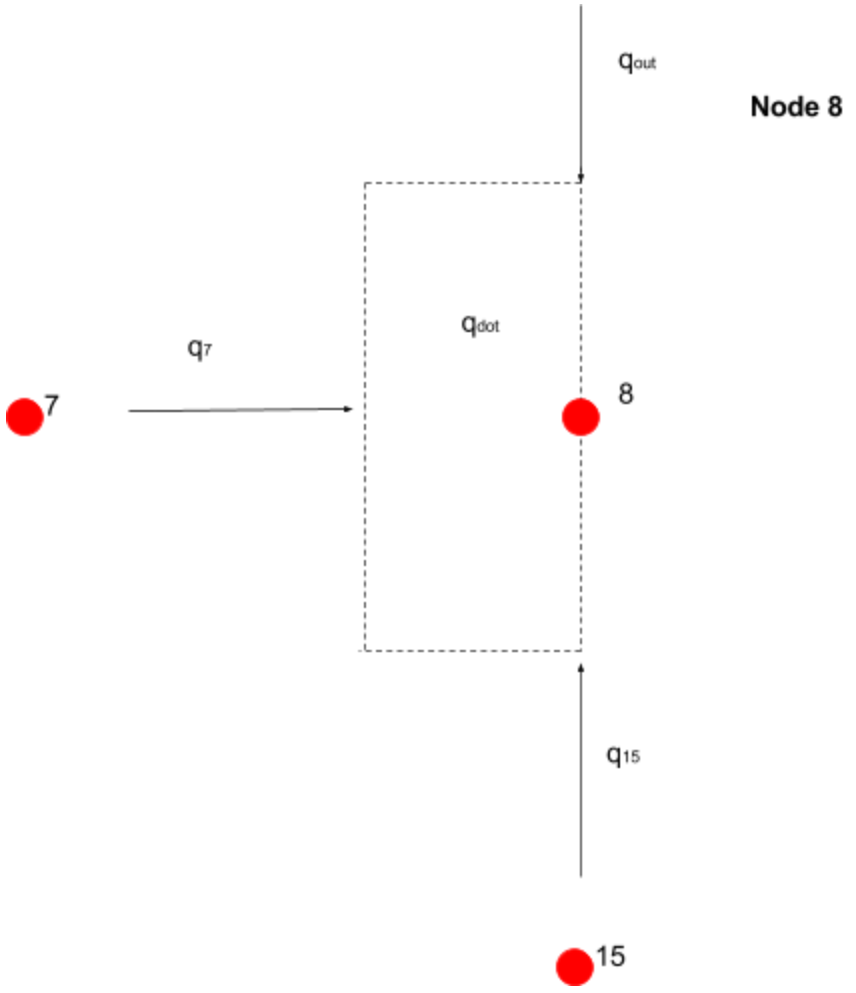
$$\dot{E}_{in} - \dot{E}_o + \dot{E}_g = \dot{E}_{st}$$

$$\dot{E}_{in} = -\dot{E}_g$$

$$q_1 + q_3 + q_9 + q_{out} = -\dot{q}\cancel{V}$$

$$\frac{k\Delta y}{\Delta x}(T_1 - T_2) + \frac{k\Delta y}{\Delta x}(T_3 - T_2) + \frac{k\Delta x}{\Delta y}(T_9 - T_2) + q''_{out}\Delta x = -\dot{q}\Delta x^2$$

$$\boxed{T_1 - 3T_2 + T_3 + T_9 = -\frac{\Delta x}{k}(q''_{out} + \dot{q}\Delta x)}$$



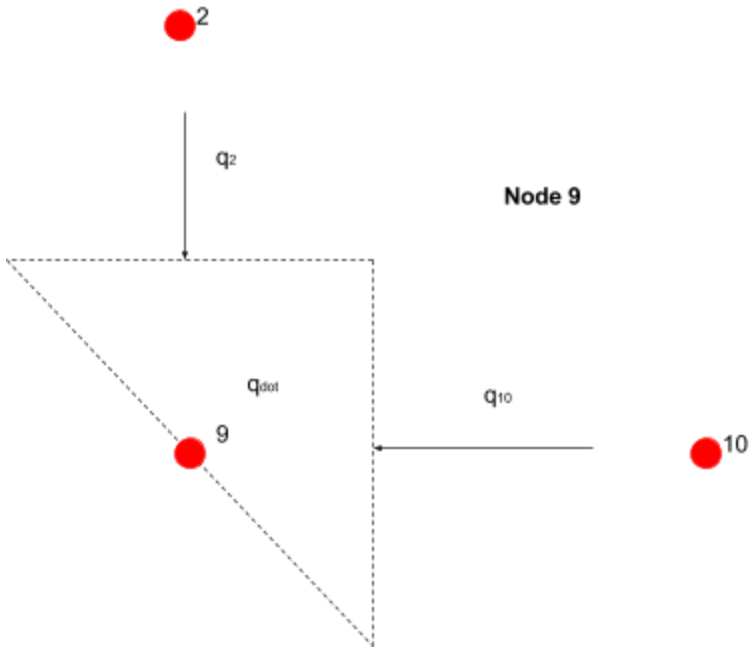
$$\dot{E_{in}} - \dot{E_o} + \dot{E_g} = \dot{E_{st}}$$

$$\dot{E_{in}} = -\dot{E_g}$$

$$q_7 + q_{15} + q_{out} = -\frac{\dot{q}\forall}{2}$$

$$\frac{k\Delta y}{\Delta x}(T_7 - T_8) + \frac{k\Delta x}{2\Delta y}(T_{15} - T_8) + \frac{q''_{out}\Delta x}{2} = -\frac{\dot{q}\Delta x^2}{2}$$

$$\boxed{T_7 - 3T_8 + T_{15} = -\frac{\Delta x}{2k}(q''_{out} + \dot{q}\Delta x)}$$

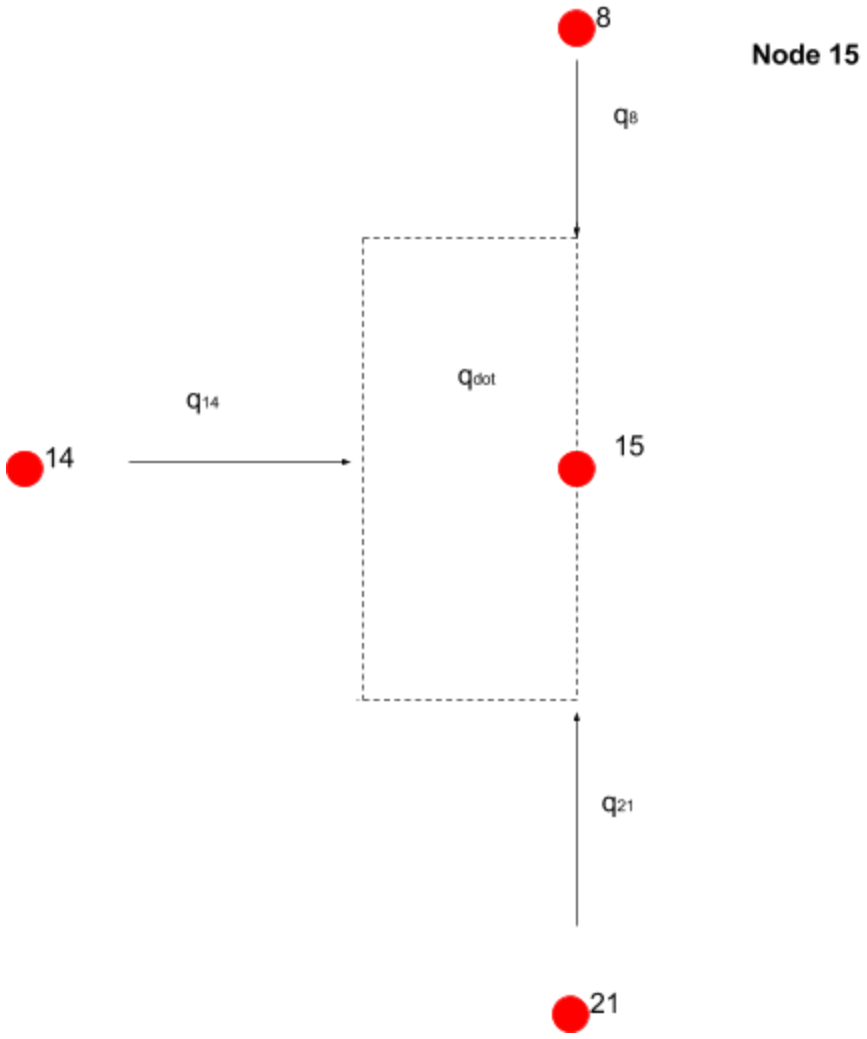


$$\dot{E_{in}} - \dot{E_o} + \dot{E_g} = \dot{E_{st}}$$

$$\dot{E_{in}} = -\dot{E_g}$$

$$\frac{k\Delta x}{\Delta y}(T_2 - T_9) + \frac{k\Delta y}{2\Delta x}(T_{10} - T_9) = -\frac{\dot{q}\Delta x^2}{2}$$

$$\boxed{T_2 - 2T_9 + T_{10} = -\frac{\dot{q}\Delta x^2}{2k}}$$



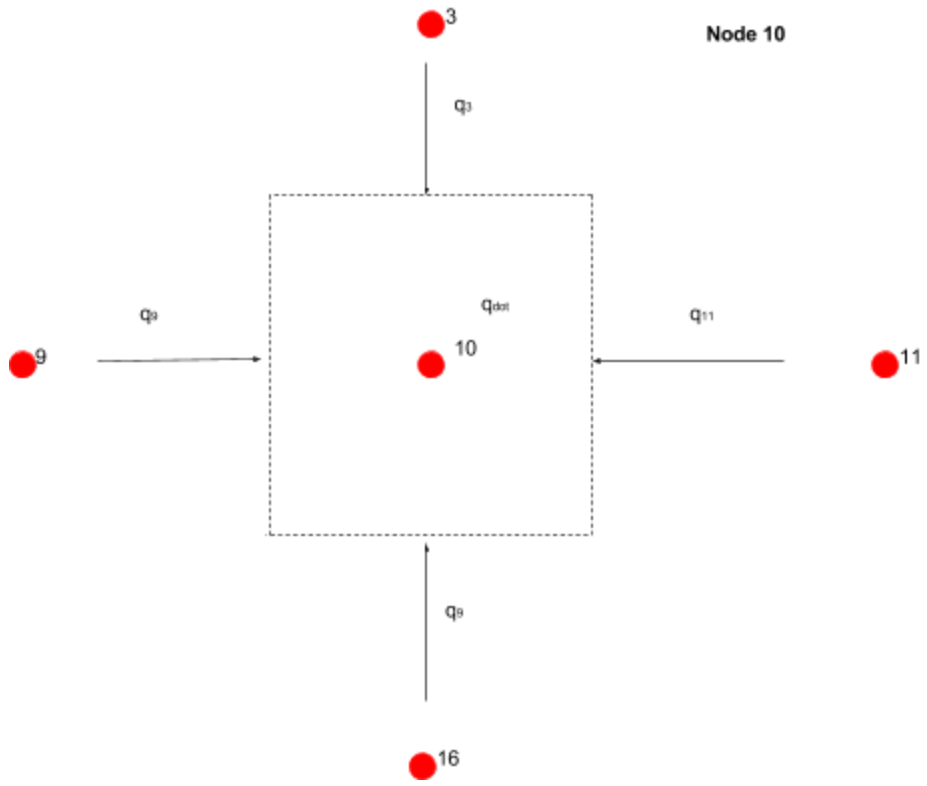
$$\dot{E_{in}} - \dot{E_o} + \dot{E_g} = \dot{E_{st}}$$

$$\dot{E_{in}} = -\dot{E_g}$$

$$q_8 + q_{14} + q_{21} = -\frac{\dot{q}\cancel{V}}{2}$$

$$\frac{k\Delta x}{2\Delta y}(T_8 - T_{15}) + \frac{k\Delta y}{\Delta x}(T_{14} - T_{15}) + \frac{k\Delta x}{2\Delta y}(T_{21} - T_{15}) = -\frac{\dot{q}\Delta x^2}{2}$$

$$\boxed{T_8 + 2T_{14} - 4T_{15} + T_{21} = -\frac{\dot{q}\Delta x^2}{k}}$$



$$\dot{E_{in}} - \dot{E_o} + \dot{E_g} = \dot{E_{st}}$$

$$\dot{E_{in}} = -\dot{E_g}$$

$$q_3 + q_9 + q_{11} + q_{16} = -\dot{q}\cancel{V}$$

$$\frac{k\Delta x}{\Delta y}(T_3 - T_{10}) + \frac{k\Delta y}{\Delta x}(T_9 - T_{10}) + \frac{k\Delta y}{\Delta x}(T_{11} - T_{10}) = -\dot{q}\Delta x^2$$

$$\boxed{T_3 + T_9 - 4T_{10} + T_{11} + T_{16} = -\frac{\dot{q}\Delta x^2}{k}}$$