by symmetry ....

$q1 = q3 = q7 = q9$

$q2 = q4 = q6 = q8$

$$\eta_{ii} = \sum_{j=1}^{4} \frac{s_{ij}}{t_{ij}} \qquad \eta_{ik} = \frac{s_{ik}}{t_{ik}}$$

ORIGIN := 1

$\eta_{1,1} := 4 \cdot \frac{a}{t}$ $\quad \eta_{1,2} := 2 \cdot \frac{a}{t}$

by symmetry q4=q2 so q1 has 2*a length in common with q2

$\eta_{2,1} := 2 \cdot \frac{a}{t}$ $\quad \eta_{2,2} := 4 \cdot \frac{a}{t}$ $\quad \eta_{2,5} := \frac{a}{t}$

by symmetry q3=q1 so q2 has 2*a length in common with q1 1nd 1*a in common with q5

$\eta_{5,2} := 4 \cdot \frac{a}{t}$ $\quad \eta_{5,5} := 4 \cdot \frac{a}{t}$

by symmetry q4=q6=q8=q2 so q5 has 4*a length in common with q2

$$\begin{pmatrix} \eta_{1,1} & -\eta_{1,2} & 0 \\ -\eta_{2,1} & \eta_{2,2} & -\eta_{2,5} \\ 0 & -\eta_{5,2} & \eta_{5,5} \end{pmatrix} \cdot \begin{pmatrix} q\_bar_1 \\ q\_bar_2 \\ q\_bar_5 \end{pmatrix} = \begin{pmatrix} a^2 \\ a^2 \\ a^2 \end{pmatrix}$$

$$\begin{pmatrix} q\_bar_1 \\ q\_bar_2 \\ q\_bar_5 \end{pmatrix} := \begin{pmatrix} \eta_{1,1} & -\eta_{1,2} & 0 \\ -\eta_{2,1} & \eta_{2,2} & -\eta_{2,5} \\ 0 & -\eta_{5,2} & \eta_{5,5} \end{pmatrix}^{-1} \cdot \begin{pmatrix} a^2 \\ a^2 \\ a^2 \end{pmatrix} \qquad q\_bar \rightarrow \begin{pmatrix} \frac{11}{16} \cdot a \cdot t \\ \frac{7}{8} \cdot a \cdot t \\ 0 \\ 0 \\ \frac{9}{8} \cdot a \cdot t \end{pmatrix}$$

we need to account for all the cells in calculating J or q from the known q_bar

$$q\_bar := \begin{pmatrix} q\_bar_1 \\ q\_bar_2 \\ q\_bar_1 \\ q\_bar_2 \\ q\_bar_5 \\ q\_bar_2 \\ q\_bar_1 \\ q\_bar_2 \\ q\_bar_1 \end{pmatrix}$$

$i := 1..9$

$A_i := a^2$

$A \cdot q\_bar$ does the sum in mathcad

aside ...

$J := 4 \cdot A \cdot q\_bar$

$J \rightarrow \frac{59}{2} \cdot a^3 \cdot t$

$$q_i := T \cdot \frac{q\_bar_i}{2 \cdot A \cdot q\_bar} \qquad \begin{pmatrix} q_1 \\ q_2 \\ q_5 \end{pmatrix} \rightarrow \begin{pmatrix} \frac{11}{236} \cdot \frac{T}{a^2} \\ \frac{7}{118} \cdot \frac{T}{a^2} \\ \frac{9}{118} \cdot \frac{T}{a^2} \end{pmatrix}$$

and ...

$q_{12} := q_1 - q_2 \qquad q_{12} \rightarrow \frac{-3}{236} \cdot \frac{T}{a^2}$

negative means it is down (- as seen from cell 1)

$q_{25} := q_2 - q_5 \qquad q_{25} \rightarrow \frac{-1}{59} \cdot \frac{T}{a^2}$

negative means it is to the left (- as seen from cell 2)