

$x_{nc} := 3$ = # vertical columns of bolts $spac := 2.5$ = horizontal bolt spacing

$ynr := 5$ = # horizontal rows of bolts $spar := 3$ = vertical bolt pitch

$i := 0..x_{nc} - 1$

$j := 0..ynr - 1$

$$x_i := spac \cdot i - \frac{spac \cdot (x_{nc} - 1)}{2}$$

$$y_j := spar \cdot j - \frac{spar \cdot (ynr - 1)}{2}$$

x coordinate of
each bolt in the bolt group:

y coordinate of
each bolt in the bolt group:

$x_j =$

-2.5
0
2.5

$y_j =$

-6
-3
0
3
6

$$\Delta_{max} := 0.34$$

$$l_{max} := \sqrt{(x_0)^2 + (y_0)^2}$$

This is the length of each bolt from the centroid as
each bolt is oriented in the bolt group--just a check

$$l_{max} = 6.5$$

$$l_{j,i} := \sqrt{(x_i)^2 + (y_j)^2}$$

$$l = \begin{pmatrix} 6.5 & 6 & 6.5 \\ 3.905 & 3 & 3.905 \\ 2.5 & 0 & 2.5 \\ 3.905 & 3 & 3.905 \\ 6.5 & 6 & 6.5 \end{pmatrix}$$

$$C' := \sum_{m=0}^{ynr-1} \sum_{n=0}^{x_{nc}-1} \left[l_{m,n} \cdot \left(1 - e^{\frac{-10 \cdot l_{m,n} \Delta_{max}}{l_{max}}} \right)^{0.55} \right]$$

$$C' = 61.183$$