Day – 6

1:) $D_{ij} = \delta_{ij}\cos\theta - \varepsilon_{ijk} n_k \sin\theta + (1-\cos\theta) n_i n_j$

$\theta = \frac{2\pi}{3}$, $n_1 = n_2 = n_3 = 1$

$D_{11} = -\frac{1}{2} + \left(1+\frac{1}{2}\right) \times 1 \times 1 = 1$

$D_{12} = -\frac{\sqrt{3}}{2} + \frac{3}{2}$

$D_{13} = \frac{\sqrt{3}}{2} + \frac{3}{2}$

$D_{21} = \frac{\sqrt{3}}{2} + \frac{3}{2}$

$D_{22} = -\frac{1}{2} + \frac{3}{2} = 1$

$D_{23} = -\frac{\sqrt{3}}{2} + \frac{3}{2}$

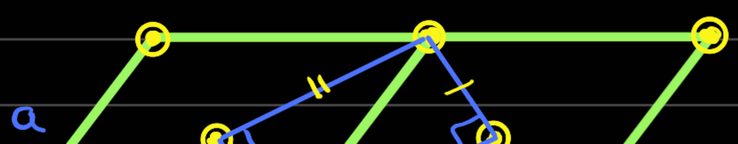
$D_{31} = -\frac{\sqrt{3}}{2} + \frac{3}{2}$

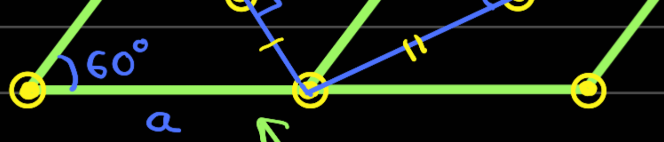
$D_{32} = \frac{\sqrt{3}}{2} + \frac{3}{2}$

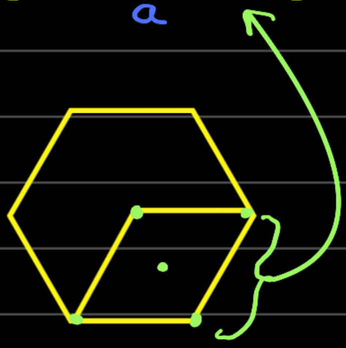
$D_{33} = -\frac{1}{2} + \frac{3}{2} = 1$

so matrix = $\begin{bmatrix} 1 & \frac{3-\sqrt{3}}{2} & \frac{3+\sqrt{3}}{2} \\ \frac{3+\sqrt{3}}{2} & 1 & \frac{3-\sqrt{3}}{2} \\ \frac{3-\sqrt{3}}{2} & \frac{3+\sqrt{3}}{2} & 1 \end{bmatrix}$

2:)







The rhombus drawn is obtained from the hexagon as shown.

The dots marked in yellow are lattice points. The angles marked "$\llcorner$" are 90° as diagonals of rhombus are perpendicular to each other. Clearly, the quadrilateral drawn in blue is a rectangle.

As the lattice identified as hexagonal centred can be represented by a rectangle (op → orthogonal primitive) so the lattice is NOT in need of a new name.

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