1 Fractal N = 0

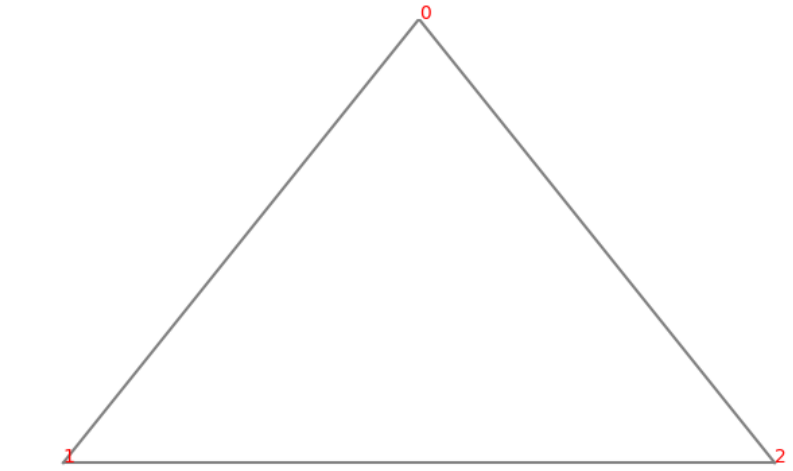

Figure 1: Lattice

1.1 Hamoltionian

$$H = \epsilon \left(\overline{\psi_{0,0}}\psi_{0,0} + \overline{\psi_{1,0}}\psi_{1,0} + \overline{\psi_{2,0}}\psi_{2,0}\right) - t \left(\overline{\psi_{0,0}}\psi_{1,0} + \overline{\psi_{0,0}}\psi_{2,0} + \overline{\psi_{1,0}}\psi_{0,0} + \overline{\psi_{1,0}}\psi_{2,0} + \overline{\psi_{2,0}}\psi_{0,0} + \overline{\psi_{2,0}}\psi_{1,0}\right)$$

1.2 Matrix

$$\begin{bmatrix} \epsilon & -t & -t \\ -t & \epsilon & -t \\ -t & -t & \epsilon \end{bmatrix}$$

1.3 Eigen Values

$\{\epsilon - 2t : 1,\ \epsilon + t : 2\}$

1.4 Eigen Vectors

$$\left[\left(\epsilon - 2t,\ 1,\ \left[\begin{bmatrix}1\\1\\1\end{bmatrix}\right]\right),\ \left(\epsilon + t,\ 2,\ \left[\begin{bmatrix}-1\\1\\0\end{bmatrix},\ \begin{bmatrix}-1\\0\\1\end{bmatrix}\right]\right)\right]$$