Define the vector:

$$\vec{d} = (d_1, d_2, d_3)$$

The Hamiltonian is given by:

$$H = \sum_{j=1}^{3} d_j \otimes \sigma_j$$

The components of $\vec{d}$ are defined in terms of the physical parameters t, M, and B as follows:

$$d_1 = t\tilde{d}_1$$

$$d_2 = t\tilde{d}_2$$

$$d_3 = (M - 4B)\mathbb{I} + B\tilde{d}_3$$

The $\tilde{d}_1$ component hopping values A_j and B_j are:

$$A_1 = \frac{i}{2}, \quad A_2 = -\frac{i}{4}, \quad A_3 = -\frac{i}{4}$$

$$B_1 = -\frac{i}{2}, \quad B_2 = \frac{i}{4}, \quad B_3 = \frac{i}{4}$$

The $\tilde{d}_2$ component hopping values A_j and B_j are:

$$A_1 = 0, \quad A_2 = \frac{i\sqrt{3}}{4}, \quad A_3 = -\frac{i\sqrt{3}}{4}$$

$$B_1 = 0, \quad B_2 = -\frac{i\sqrt{3}}{4}, \quad B_3 = \frac{i\sqrt{3}}{4}$$

The $\tilde{d}_3$ component hopping values A_j and B_j are:

$$A_1 = 1, \quad A_2 = 1, \quad A_3 = 1$$

$$B_1 = 1, \quad B_2 = 1, \quad B_3 = 1$$