$$H_{12} = \begin{bmatrix} -4\,h - 6\,\mu + U & -\mathbf{i}\,\sqrt{\frac{3}{2}}\,t - \frac{3\,t}{\sqrt{2}} & 0 \\ \mathbf{i}\,\sqrt{\frac{3}{2}}\,t - \frac{3\,t}{\sqrt{2}} & -4\,h - 6\,\mu + U & \frac{-3\,t}{2} - \frac{\mathbf{i}}{2}\,\sqrt{3}\,t \\ 0 & \frac{-3\,t}{2} + \frac{\mathbf{i}}{2}\,\sqrt{3}\,t & -4\,h - 6\,\mu + U \end{bmatrix}$$