$$H_9 = \begin{bmatrix} -4\,h - 6\,\mu + U & \mathbf{i}\sqrt{\frac{3}{2}}\,t - \frac{t}{\sqrt{2}} & 0 & 0 \\ -\mathbf{i}\sqrt{\frac{3}{2}}\,t - \frac{t}{\sqrt{2}} & -4\,h - 6\,\mu + U & \frac{-t}{2} + \frac{\mathbf{i}}{2}\sqrt{3}\,t & 0 \\ 0 & \frac{-t}{2} - \frac{\mathbf{i}}{2}\sqrt{3}\,t & -4\,h - 6\,\mu + U & \mathbf{i}\sqrt{\frac{3}{2}}\,t - \frac{t}{\sqrt{2}} \\ 0 & 0 & -\mathbf{i}\sqrt{\frac{3}{2}}\,t - \frac{t}{\sqrt{2}} & -4\,h - 6\,\mu \end{bmatrix}$$