54^{th} Eigenvector

$$\boldsymbol{N_e = 3 \qquad s = \frac{1}{2} \qquad m_s = -\frac{1}{2}}$$

Irred. Representation : $\boldsymbol{\Gamma_{4,3}}$

$$E_{54} = \frac{1}{3}\left(-J + 3t + 2U + 14W - 2\cos(\theta_4)\sqrt{A_5}\right)$$

$$\begin{aligned}
|\Psi_{54}\rangle &= |3, \frac{1}{2}, -\frac{1}{2}, \Gamma_{4,3}\rangle \\
&= C_{54,1}\left(|002d\rangle - |00d2\rangle - |02d0\rangle + |0d20\rangle + |200d\rangle + |2d00\rangle - |d002\rangle - |d200\rangle\right) \\
&+ C_{54,2}\left(|020d\rangle + |0d02\rangle - |20d0\rangle - |d020\rangle\right) \\
&+ C_{54,3}\left(|0ddu\rangle - |0udd\rangle + |d0ud\rangle - |dd0u\rangle - |ddu0\rangle + |du0d\rangle - |u0dd\rangle + |udd0\rangle\right)
\end{aligned}$$

$$\begin{aligned}
C_{54-1} &= \frac{t\left(J - 4t + U - 2W + 2\cos(\theta_4)\sqrt{A_5}\right)}{2\sqrt{2}} \\
C_{54-2} &= \frac{t\left(J + 12t + U - 2W + 2\cos(\theta_4)\sqrt{A_5}\right)}{3\sqrt{2}} \\
C_{54-3} &= \frac{-15t^2 - 5Ut - U^2 + J(t + 2U + 8W)}{6\sqrt{2}} \\
&+ \left(\frac{A_{19}^2 + 6(4J - 13t - 10U - 32W)W + 6(t + 2U + 8W)\cos(\theta_4)\sqrt{A_5}}{18\sqrt{2}}\right) \\
N_{54} &= 2\sqrt{2C_{54,1}^2 + C_{54,2}^2 + 2C_{54,3}^2}
\end{aligned}$$