56^{th} Eigenvector

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

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

$$E_{56} = \frac{A_{20}}{3}$$

$$\begin{aligned}
|\Psi_{56}\rangle &= |3, \frac{1}{2}, -\frac{1}{2}, \Gamma_{4,3}\rangle \\
&= C_{56,1}\left(|002d\rangle - |00d2\rangle - |02d0\rangle + |0d20\rangle + |200d\rangle + |2d00\rangle - |d002\rangle - |d200\rangle\right) \\
&+ C_{56,2}\left(|020d\rangle + |0d02\rangle - |20d0\rangle - |d020\rangle\right) \\
&+ C_{56,3}\left(|0ddu\rangle - |0udd\rangle + |d0ud\rangle - |dd0u\rangle - |ddu0\rangle + |du0d\rangle - |u0dd\rangle + |udd0\rangle\right)
\end{aligned}$$

$$\begin{aligned}
C_{56-1} &= \frac{t(J-4t+U)}{2\sqrt{2}} \\
&+ \left(\frac{t\left(U - 2W + \left(\sqrt{3}\sin(\theta_4) - \cos(\theta_4)\right)\sqrt{A_5}\right)}{2\sqrt{2}}\right) \\
C_{56-2} &= \frac{t(J+12t+U)}{3\sqrt{2}} \\
&+ \left(\frac{t\left(U - 2W + \left(\sqrt{3}\sin(\theta_4) - \cos(\theta_4)\right)\sqrt{A_5}\right)}{3\sqrt{2}}\right) \\
C_{56-3} &= \frac{A_{20}^2 - 3(t+2U+8W)A_{20} + 9\left(-4t^2 + (U+4W)t + (U+4W)^2\right)}{18\sqrt{2}} \\
N_{56} &= 2\sqrt{2C_{56,1}^2 + C_{56,2}^2 + 2C_{56,3}^2}
\end{aligned}$$