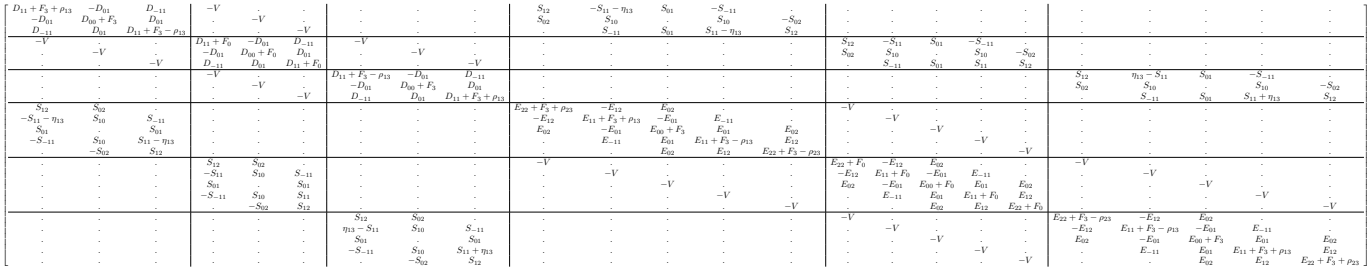
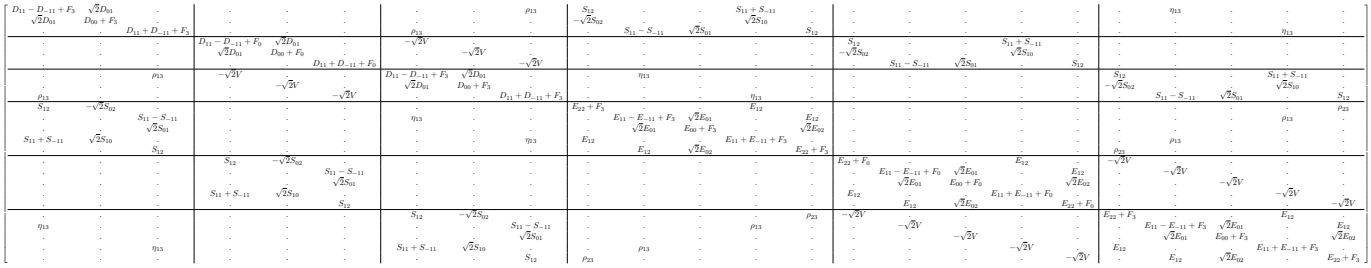
4 Symmetries in Single Diagonalization Approach

For J=3/2, m=-3,0,3:



After unitary transformations:



A_1 matrix:

$D_{11}-D_{-11}+F_3$	$\sqrt{2}D_{01}$	.	ρ_{13}	S_{12}	$S_{11}+S_{-11}$	.	.	.	η_{13}	.	.
$\sqrt{2}D_{01}$	$D_{00}+F_3$	.	.	$-\sqrt{2}S_{02}$	$\sqrt{2}S_{10}$	.	.	.	.	.	.
.	.	$D_{11}+D_{-11}+F_0$	$-\sqrt{2}V$	.	.	$S_{11}-S_{-11}$	$\sqrt{2}S_{01}$	S_{12}	.	.	.
ρ_{13}	.	$-\sqrt{2}V$	$D_{11}+D_{-11}+F_3$	.	η_{13}	.	.	.	$S_{11}-S_{-11}$	$\sqrt{2}S_{01}$	S_{12}
S_{12}	$-\sqrt{2}S_{02}$	.	.	$E_{22}+F_3$	E_{12}	.	.	.	.	.	ρ_{23}
$S_{11}+S_{-11}$	$\sqrt{2}S_{10}$	.	η_{13}	E_{12}	$E_{11}+E_{-11}+F_3$	.	.	.	ρ_{13}	.	.
.	.	$S_{11}-S_{-11}$	.	.	.	$E_{11}-E_{-11}+F_0$	$\sqrt{2}E_{01}$	E_{12}	$-\sqrt{2}V$	.	.
.	.	$\sqrt{2}S_{01}$	.	.	.	$\sqrt{2}E_{01}$	$E_{00}+F_0$	$\sqrt{2}E_{02}$	.	$-\sqrt{2}V$	.
.	.	S_{12}	.	.	.	E_{12}	$\sqrt{2}E_{02}$	$E_{22}+F_0$	.	.	$-\sqrt{2}V$
η_{13}	.	.	$S_{11}-S_{-11}$	.	ρ_{13}	$-\sqrt{2}V$	.	.	$E_{11}-E_{-11}+F_3$	$\sqrt{2}E_{01}$	E_{12}
.	.	.	$\sqrt{2}S_{01}$	.	.	.	$-\sqrt{2}V$	.	$\sqrt{2}E_{01}$	$E_{00}+F_3$	$\sqrt{2}E_{02}$
.	.	.	S_{12}	ρ_{23}	.	.	.	$-\sqrt{2}V$	E_{12}	$\sqrt{2}E_{02}$	$E_{22}+F_3$

A_2 matrix:

$D_{11}+D_{-11}+F_3$	.	.	ρ_{13}	.	$S_{11}-S_{-11}$	$\sqrt{2}S_{01}$	S_{12}	.	.	.	η_{13}
.	$D_{11}-D_{-11}+F_0$	$\sqrt{2}D_{01}$	$-\sqrt{2}V$	.	.	.	.	S_{12}	$S_{11}+S_{-11}$	.	.
.	$\sqrt{2}D_{01}$	$D_{00}+F_0$	.	$-\sqrt{2}V$	.	.	.	$-\sqrt{2}S_{02}$	$\sqrt{2}S_{10}$	.	.
ρ_{13}	$-\sqrt{2}V$	.	$D_{11}-D_{-11}+F_3$	$\sqrt{2}D_{01}$	η_{13}	.	.	.	.	S_{12}	$S_{11}+S_{-11}$
.	.	$-\sqrt{2}V$	$\sqrt{2}D_{01}$	$D_{00}+F_3$	.	.	.	.	.	$-\sqrt{2}S_{02}$	$\sqrt{2}S_{10}$
$S_{11}-S_{-11}$	.	.	η_{13}	.	$E_{11}-E_{-11}+F_3$	$\sqrt{2}E_{01}$	E_{12}	.	.	.	ρ_{13}
$\sqrt{2}S_{01}$	.	.	.	.	$\sqrt{2}E_{01}$	$E_{00}+F_3$	$\sqrt{2}E_{02}$	.	.	.	.
S_{12}	.	.	.	.	E_{12}	$\sqrt{2}E_{02}$	$E_{22}+F_3$	.	.	ρ_{23}	.
.	S_{12}	$-\sqrt{2}S_{02}$	.	.	.	.	.	$E_{22}+F_0$	E_{12}	$-\sqrt{2}V$	.
.	$S_{11}+S_{-11}$	$\sqrt{2}S_{10}$	.	.	.	.	.	E_{12}	$E_{11}+E_{-11}+F_0$	.	$-\sqrt{2}V$
.	.	.	S_{12}	$-\sqrt{2}S_{02}$	.	.	$-\sqrt{2}V$	.	.	$E_{22}+F_3$	E_{12}
.	.	.	$S_{11}+S_{-11}$	$\sqrt{2}S_{10}$	ρ_{13}	.	.	$-\sqrt{2}V$	.	E_{12}	$E_{11}+E_{-11}+F_3$