Global matrix

$$S_{dis} = \begin{bmatrix} S^{(1)} & 0 \\ 0 & S^{(2)} \end{bmatrix} = \begin{bmatrix} 0.5, & -0.5, & 0, & 0, & 0, & 0 \\ -0.5, & 1, & -0.5, & 0, & 0, & 0 \\ 0, & -0.5, & 0.5, & 0, & 0, & 0 \\ 0, & 0, & 0, & 1, & -0.5, & -0.5 \\ 0, & 0, & 0, & -0.5, & 0.5, & 0 \\ 0, & 0, & 0, & -0.5, & 0, & 0.5 \end{bmatrix}$$

Since

$$\underbrace{\begin{bmatrix} U_1 \\ U_2 \\ U_3 \\ U_4 \\ U_5 \\ U_6 \end{bmatrix}}_{U_{dis}} = \underbrace{\begin{bmatrix} 1, & 0, & 0, & 0 \\ 0, & 1, & 0, & 0 \\ 0, & 0, & 1, & 0 \\ 0, & 0, & 0, & 1 \\ 1, & 0, & 0, & 0 \\ 0, & 0, & 1, & 0 \end{bmatrix}}_{C} \underbrace{\begin{bmatrix} U_1 \\ U_2 \\ U_3 \\ U_4 \end{bmatrix}}_{U_{conj}}$$

$$W = \frac{1}{2} U_{dis}^T S_{dis} U_{dis}$$

And $\quad S \overset{(global)}{=} C^T S_{dis} C$

$$\Rightarrow$$

$$S^{(global)} = \begin{bmatrix} 1, & -0.5, & 0, & -0.5 \\ -0.5, & 1, & -0.5, & 0 \\ 0, & -0.5, & 1, & -0.5 \\ -0.5, & 0, & -0.5, & 1 \end{bmatrix}$$