

$$T_1 = \frac{1}{\sqrt{2}}U \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & -1 \\ 0 & 1 & 0 \end{bmatrix} V^T$$

where

$$U \in \mathbb{R}^{3 \times 3}$$

$$V \in \mathbb{R}^{3 \times 3}$$