

Structure-preserving transformations in presence of rounding errors

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$$A = (a_1, \dots, a_n) \in \mathcal{R}^{m,n}, \quad m \geq \text{rank}(A) = n$$

structure-preserving basis Q of $\text{span}(A)$

$$Q = (q_1, \dots, q_n) \in \mathcal{R}^{m,n}, \quad Q^T M Q = M$$

$$A = QR, \quad R \text{ upper triangular}$$

$$M = I, M \text{ SPD}, M = \begin{pmatrix} I & 0 \\ 0 & -I \end{pmatrix}, M = \begin{pmatrix} 0 & I \\ -I & 0 \end{pmatrix}, \dots$$

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