

qrnotes

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$$X_0 = U_0 R_0 \quad W_k = U_0 U_0^T X_k$$

$$\|W_k(W_k^T W_k)^{-1} W_k^T r\| = \|X_k^T U_0 U_0^T (X_k^T U_0 U_0^T U_0 U_0^T X_k)^{-1} X_k^T U_0 U_0^T r\| = \|X_k^T U_0 U_0^T (X_k^T U_0 U_0^T X_k)^{-1} X_k^T U_0 U_0^T r\|$$