

$$\begin{aligned}
J^\star &= \text{Tr}(\bar{\mathbf{S}}\bar{\Sigma}\mathbf{C}^*\mathbf{V}^{-1}\mathbf{C}\bar{\Sigma} + \bar{\Sigma}\mathbf{Q}) \\
&= \text{Tr}(\bar{\Sigma}\bar{\mathbf{S}}\mathbf{B}\mathbf{R}^{-1}\mathbf{B}^*\bar{\mathbf{S}} + \bar{\mathbf{S}}\mathbf{W}),
\end{aligned}$$