Optimal Unknown Input and State Estimation Design

\[
EX_{k+1} = A^X_k X_k + B^X_k \tilde{u}_k + w^X_k,
\]
\[
\Rightarrow X_{k+1} = \begin{bmatrix} A^X_k & B^X_k & 0 \\ 0 & 0 & I \end{bmatrix} X_k + \begin{bmatrix} 0 \\ 0 \end{bmatrix} \tilde{u}_k + \begin{bmatrix} w^X_k \\ w_k \end{bmatrix}
\]

\[
y_k = C^X_k X_k + \tilde{u}_k^T + v_k,
\]
\[
\hat{X}_{k|k} = \hat{X}_{k|k-1} + V_k D_k, \quad P_{k|k} = P_{k|k-1} + V_k P_{k|k-1} V_k^T
\]

(\text{In State and Fault Estimation})

\[
\hat{x}_{k|k} = f(\hat{x}_{k-1|k-1}, \ldots, \hat{x}_{k|k-1}) \quad \hat{\tilde{u}}_{k|k} = g(\hat{x}_{k-1|k-1}, \ldots, \hat{x}_{k|k-1})
\]

Application to Robust State and Fault Estimation of a Two Link Robot

Publications:


