Table 1: Multi-sensor Fusion Rules

| Types of Estimation Errors | Fusion Rules | Comments |
|---|---|---|
| No Correlations (Independent) | $P_f = (\sum_{i=1}^{n} P_i^{-1})^{-1}$ $\qquad$ $\hat{x}_f = P_f(\sum_{i=1}^{n} P_i^{-1}\hat{x}_i)$ | Optimal |
| Known Correlations (Correlated) | $P_f = (e^T \Sigma^{-1} e)^{-1}$ * $\qquad$ $\hat{x}_f = P_f(e^T \Sigma^{-1} \hat{x})$ | Optimal |
| Unknown Correlations | $P_f = (\sum_{i=1}^{n} \omega_i P_i^{-1})^{-1}$ ** $\qquad$ $\hat{x}_f = P_f(\sum_{i=1}^{n} \omega_i P_i^{-1}\hat{x}_i)$ | Suboptimal |

* $e = [I, \cdots, I]^T$, $\Sigma = (P_{ij})$, $i, j = 1, \cdots, n$, and $\hat{x} = [\hat{x}_1^T, \cdots, \hat{x}_n^T]^T$.
** Covariance intersection rule, where $\omega_i \in [0, 1]$, $\sum_{i=1}^{n} \omega_i = 1$, and $\omega_i = \arg\min_{\omega_i \in [0,1]} \text{tr}\{P_f\}$.