Add noise (independent to state)

September 2024

State and Output Equations

State Equations

- In this scenario, since there is no input $\mathbf{u}$, we assume that process noise $\mathbf{w}_k$ is normally distributed with zero mean, and the covariance matrix $\mathbf{Q}_k$ is zero (i.e., no process noise).

$$\mathbf{x}_k = \mathbf{f_d}(\mathbf{x}_{k-1}) + \mathbf{w}_k, \quad \mathbf{w}_k \sim \mathcal{N}(0, \mathbf{Q}_k)$$

Output Equations

- Measurement noise $\mathbf{v}_k$ is normally distributed with zero mean and covariance $\mathbf{R}_k$.

$$\mathbf{y}_k = \mathbf{h}(\mathbf{x}_k) + \mathbf{v}_k, \quad \mathbf{v}_k \sim \mathcal{N}(0, \mathbf{R}_k)$$