

1 LPV Kalman Filter Algorithm

The following algorithm is based on the functionality of the observer. A numerical simulation with the observer code is provided in the folder

Algorithm 1 LPV Kalman Observer

Require: Input $u(k)$, Output $y(k)$

Ensure: State estimate $\hat{x}(k)$

- 1: Compute offline optimal gains
 - 2: Initialize observer states $\hat{x}(0)$
 - 3: Define the total number of Steps
 - 4: Observer triggered
 - 5: **while** $k < \text{Steps}$ **do**
 - 6: Define the bounds of the scheduling variables
 - 7: Compute the estimated scheduling functions $\psi_i(\hat{\varphi}(k))$
 - 8: Interpolate the observer gains
 - 9: $\mathcal{L}(\hat{\varphi}(k)) \leftarrow \sum_{i=1}^{2^l} \psi_i(\hat{\varphi}(k)) \mathcal{L}_i$
 - 10: Compute the LPV Kalman Filter and update the states
 - 11: $k \leftarrow k + 1$ ▷ Advance one step
 - 12: **end while**
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