Zustandsraummodell

Zustand

$$\underline{z}(k) = \begin{bmatrix} y(k) \\ v(k) \end{bmatrix}$$

$y(k)$: Längskoordinate

$v(k)$: Längsgeschwindigkeit

Systemmodell

$$\underline{z}(k+1) = \begin{bmatrix} y(k+1) \\ v(k+1) \end{bmatrix} = \begin{bmatrix} y(k) + v(k)\cdot T \\ v(k) \end{bmatrix} + \begin{bmatrix} T\cdot n(k) \\ n(k) \end{bmatrix}$$

$n(k)$: Rauschen

$$\underline{z}(k+1) = \underline{\Phi}_d\,\underline{z}(k) + \underline{G}_d\,n(k)$$

$$\underline{z}(k+1) = \underbrace{\begin{bmatrix} 1 & T \\ 0 & 1 \end{bmatrix}}_{\underline{\Phi}_d} \underbrace{\begin{bmatrix} y(k) \\ v(k) \end{bmatrix}}_{\underline{z}(k)} + \underbrace{\begin{bmatrix} T \\ 1 \end{bmatrix}}_{\underline{G}_d} n(k)$$

Messmodelle

$$\hat{\underline{h}}(k) = \underline{C}\cdot\underline{z}(k) + \underline{m}(k)$$

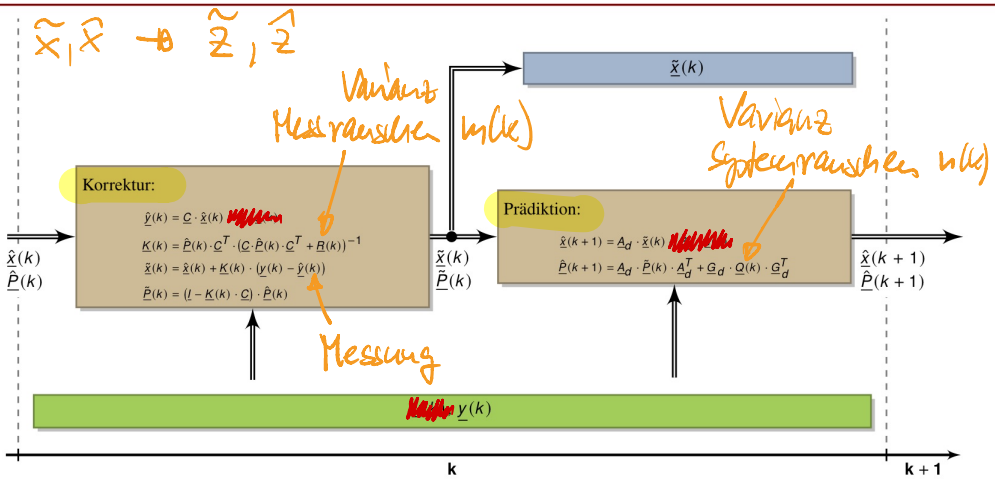
fehlerbehaftet

$$\hat{\underline{h}}(k) = \begin{bmatrix} \hat{y}(k) \end{bmatrix} = y(k) + m(k)$$

Rauschen

$$\hat{h}(k) = \underbrace{\begin{bmatrix} 1 & 0 \end{bmatrix}}_{\underline{C}} \underline{z}(k) + m(k)$$

Zyklische Berechnung Kalman-Filter Gleichungen



Quelle: Marchthaler, Kalman-Filter [1]

$$\underline{z}(k) = \begin{bmatrix} y(k) \\ v(k) \end{bmatrix}$$

$$Cov(\underline{z}) = \begin{bmatrix} \sigma_x^2 & \sigma_{xy} \\ \sigma_{xy} & \sigma_v^2 \end{bmatrix}$$