Variables Extended Kalman Filter with Quaternions

jorhabib

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1 Variables

This document is intended to merge the notation used in the reference papers used to write this code.

LaTeX syntax	Variable Syntax	Description
$\bar{q}$	q_bar	Regular 4-Dimensional quaternion
$\hat{x}_{k+1,k}$	x_hat_1	Estimate of the state x at time k+1
$\hat{x}_{k,k}$	x_hat_k	Estimate of the state x at time k
$\hat{b}_{k+1,k}$	b_hat_q	Estimate of the gyroscope bias at time k+1
$\hat{\bar{q}}_{k+1,k}$	q_bar_hat_1	Propagated quaternion at time k+1
Φ	Phi	State transition matrix
Q_d	Q_d	Discrete time noise covariance matrix
$P_{k+1,k}$	P_1	State covariance matrix at time k+1
$H(k)$	H	Measurement matrix
r	r	Residual
$z(k+1)$	z_1	Current measurement
S	S	Covariance of the residual
R	R	Measurement noise covariance matrix
K	K	Kalman gain
$\Delta\hat{x}(+)$	Delta_x_hat	Correction term
$\delta\hat{q}$	delta_q_hat	Error quaternion. Difference between quaternion and quaternion estimate
$\delta\bar{q}$	delta_q_bar	Small rotation associated with the error quaternion $[0.5\,\delta\theta\,;\,1]$
$\delta\bar{q}$	delta_theta	Error angle vector. 3-Dimensional
$\tilde{x}$	x_tilde	Error vector $[\delta\theta; \Delta b]$
$\hat{\bar{q}}_{k+1,k+1}$	q_bar_hat_1_1	Updated quaternion
$\hat{b}_{k+1,k+1}$	b_hat_1_1	Updated bias
$\hat{\omega}_{k+1,k+1}$	omega_1_1	Updated turn rate
$\omega_{m_{k+1}}$	omega_m_1	Turn rate measurement
$P_{k+1,k+1}$	P_1_1	Updated covariance matrix