Designing a Compensator Based on Extended Kalman Filter for Elimination of Noise and Delay Effect in Tracking Loop

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Abstract: This paper introduces a new control structure in tracking loop. In this new structure a position sensor has been used to eliminate noise and delay effect of tracking sensor. The EKF based Compensator estimates the desired error and provides the controller with the appropriate control signal with respect to gimbal position that is reported by the position sensor and the tracking loop error (output of tracking sensor). We have shown that in this new structure, notwithstanding the existence of noise and delay, designing of the tracking loop controller can be done and EKF based Compensator is practical for compensating noise and delay effect of the tracking sensor. Indeed a considerable feature of the presented control structure is that designing method of the controller is simple and utilizing of the delay and noise compensator has significantly reduced complication of the design.

Keywords: *tracking system; stochastic error; two degree of freedom gimbal; thermal noise; extended Kalman filter (EKF); constant delay; variable time delay.*

Mathematics Subject Classification (2010): 93C15, 93C55, 93B52.

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