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Bayesian Approach for Multi-Mode Kalman Filter for Abnormal Estimation

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Abstract: The paper deals with Bayesian approach for multi-mode Kalman filter estimation for the states $x(k)$ from the set of successive observations $Y_k = \{y(1)y(2)\dots y(k)\}$ in normal and abnormal operations is driven. Abnormal operations may be related to fault in one of system components; sudden internal thermal noise or even missing the input signal and can be extended to the maneuver target tracking case. Whenever the abnormal operation is detected, we can start tracking the states in this mode of operation. So the main problem may be reformulated to be detection of the starting point of the abnormal operation. The numerical simulation for fault estimation of phosphor furnace in different conditions are used to show the effectiveness of the proposed approach.

Keywords: *Bayesian estimation; multi mode operation; interactive multiple model; Kalman filter fault estimation.*

Mathematics Subject Classification (2010): 93E10.

1 Introduction

Fault detection and isolation problems have many significant applications during the past three decades, such as parity space Eigen structure assignment, H_∞ filtering, H_∞ optimization, and unknown input observer [1]. It is known that multiple model systems (known as hybrid systems) are an important class of combination filtering, which are mostly used in many practical engineering and industrial fields such as maneuver target tracking systems and fault detection systems, ets. In general, the multiple model systems combine hierarchically discrete or continuous state spaces, and each state (which is called the mode) is associated with a dynamic process [2].

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