Bias Estimation Using Noise Model in Process Network Systems

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Detecting windows or intervals of when a continuous process is operating in a state of steadiness is useful especially when steady-state models are being used to optimize the process or plant on-line or in real-time. However, if an unexpected process leak or measurement bias are occurred in the system, the process variable would show the drift profile indicating that the process signal is not steady and it should be detected for an efficient process operation. It is more difficult to detect such signal drift or bias in a complex network system. In this work, we propose a detection method of the bias through an estimation technique. First, a noise model is developed to identify the bias and Kalman filter is applied to the system model augmented to the noise model. Through the bias estimation, the signal drift usually caused by process leak can be detected in the network system. We apply the proposed algorithm to two examples which are water pipe network and complex process network. The results show the effectiveness of the method even when the system has a considerable amount of noise or the process variable has a dynamics.