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example：

ABSTRACT

A multisensor estimation scheme with the ability to accommodate multiple sensor faults is presented. A switching strategy is employed such that, at each sampling time, a sensorestimator pair is selected to provide the best state estimate as measured by an optimisation criterion. We show that, if a set of conditions on the system parameters (such as bounds on thesensors noises, disturbances, operating conditions, etc.) is satisfied then the switching estimationscheme is able to guarantee fault tolerant capabilities under multiple sensor failures.

1. INTRODUCTION

Sensors are used to obtain qualitative and quantitative information of variables of interest in a dynamical system. Each type of sensor typically has a good performance under specific operating or environmental conditions. However, during certain periods of time one or more sensors can fail or operate outside their specific operating range. Thus, in some applications a single sensor is not adequate to provide reliable information due to changes in the environment, failure and other limitations. A sensible approach is then to use multiple sensors of different characteristics so as to improve the performance attained with individual sensors. Several methods have been developed to combine the data provided by multiple sensors into a single integrated measurement. One of the more popular approaches is known as sensor fusion. Most of the existing multisensor fusion literature focuses on the problem of obtaining better and more reliable estimates from the availability of multiple sensors, e.g., Luo et al. [2002], Sun and Deng [2004]. However, less attention has been given to the problem of sensor failure, e.g., Fernandez and Durrant-Whyte [1994].

In this paper we propose a novel methodology for combining measurements from multiple sensors, which consists of a sensor-switching strategy. We investigate the properties of the resulting state estimate in the presence of measurement noises and process disturbances. We show that theestimation errors remain bounded, and that they converge to zero in the absence of disturbances and measurement noises. An important practical issue that we address is that of sensor failure. We investigate the case of complete loss of information (i.e., when faulty sensors provide at their outputs only noise uncorrelated to the process variables).