

Abstract

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Application of dynamic safety margin in robust fault detection and fault tolerant control

The Dynamic Safety Margin (DSM) is defined as a performance index, whose independent variable is the distance from a predefined safety boundary, which is described in the state space by a set of inequality constraints, to the current system state. Robustness is an important issue for fault detection and isolation (FDI) system. In this work, design a robust FDI system based on DSM is applied. The fault is detected based on the analysis of DSM and isolated using a multi-model approach. The main properties of the suggested FDI system is discussed and the main limitation as well. The design of a controller based on DSM is useful to maintain a predefined margin of safety during the transient phase of the system when disturbances are present. Therefore, the application of DSM in fault tolerant control (FTC) design using in particular model predictive control (MPC) is discussed. The fruitiness of the proposed FDI system and FTC is illustrated by real-time implementation.