HYBRID FAULT DETECTION AND ISOLATION IN A HEATER BANK OF AN HVAC SYSTEM

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Heating, Ventilation and Air-Conditioning (HVAC) systems are widely used in different environments. Current HVAC systems are complex and integrate different control schemes, instruments, mechanical components, etc. Operating twenty four hours a day, these systems have to keep the quality and temperature of air in buildings, to maintain the comfort of the occupants. The performance of the control system should ideally be good even in the presence of a fault, to avoid causing discomfort in the building occupants. FDI and FTCS are methodologies that can be applied to HVAC systems to make them as robust as possible to potential faults. The application of FDI methods to HVAC systems has been proposed using different methods. Because HVAC systems are highly nonlinear and complex systems, different strategies to solve particular problems can be investigated. In this paper, a methodology is presented for fault detection and isolation using multiple models. A hybrid technique that includes probabilistic and optimization based methods is presented. The method is applied, both in simulation and by means of real-time experiments, to the heating unit of a Heating, Ventilation Air Conditioning (HVAC) system. It is shown that the addition of the probabilistic approach improves the fault diagnosis accuracy.