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Innovative Techniques for Safety, Reliability, and Security in Control Systems

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Control systems play a vital role in the advancement of many engineering and science fields. The increasing demand for safety and reliability has led to the development of fault diagnosis (FD) and fault-tolerant control (FTC) systems, which play a paramount role in safety-critical systems, such as water distribution networks, aircrafts, spacecrafts, chemical, and biochemical plants, and nuclear power plants, where even minor faults can lead to catastrophic consequences. FD has primary importance since it enables online monitoring processes, allowing for the implementation of so-called active FTC systems. In an active FTC system, the FD module determines which component exhibits abnormal behavior and feeds this information to the controller. Based on this information, it redistributes or adapts the control law to maintain stability with a controlled degradation of the system's performance. Therefore, there is an increasing interest in creating new techniques or adapting the existing fault diagnosis and fault-tolerant methods to make the above-mentioned systems *secure*. At the same time, control theory is developing ceaselessly, and new theoretical results are continually being discovered that can be used in innovative fault diagnosis and fault-tolerant control techniques.

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