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A Hybrid Approach based on Fault Tree and Bayesian Network for Maintenance and Fault Diagnosis of Safety Instrumented System

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Abstract

The safety instrumented systems (SISs) are used in the oil and gas industry to detect the onset of hazardous events and/or to mitigate their consequences to humans, assets and environment. A relevant problem concerning these systems is failure diagnosis and maintenance. In this paper, a hybrid approach based on Fault Tree Analysis (FTA) and Bayesian Network (BN) that has been developed to satisfy the requirements of fault diagnosis, repair and maintenance of SIS. The proposed methodology offers significant advantages such as systematical determination of the sequence of fault diagnosis and repair action, especially FTA is used to identify all potential sources of SIS failure and generate a Marginal Importance Factor (MIF) for all basic events. Finally, we add influencing factors by mapping fault tree into equivalent Bayesian Network in order to see the influence of maintenance on the probability of failure on demand (PFD) of SIS.

Keywords

SIS; Fault Tree; Bayesian Network Modeling; Critical fault diagnosis; Maintenance and support.

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