Real Time Risk Analysis of Kick Detection: Testing and Validation

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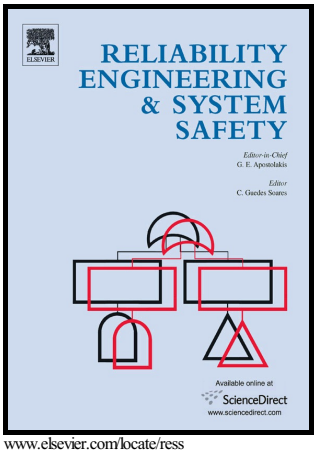

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Abstract

Oil and gas development is moving into harsh and remote locations where the highest level of safety is required. A blowout is one of the most feared accidents in oil and gas developments projects. The main objective of this paper is to test and validate the kick detection of blowout risk assessment model using uniquely developed experimental results. Kick detection is a major part of the blowout risk assessment model. The accuracy and timeliness of kick detection are dependent on the monitoring of multiple downhole parameters such as downhole pressure, fluid density, fluid conductivity and mass flow rate. In the present study these four parameters are considered in different logical combinations to assess the occurrence of kick and associated blowout risk. The assessed results are compared against the experimental observations. It is observed that simultaneous monitoring of mass flow rate combined with any one the three parameters provides most reliable detection of kick and potential blowout likelihood. The current work presents the framework for a dynamic risk assessment and management model. Upon success testing of this approach at the pilot and field levels, this approach could provide a paradigm shift in drilling safety.

Keywords: Bowtie model; Blowout model; Drilling; Kick detection; Risk assessment; Harsh environment.