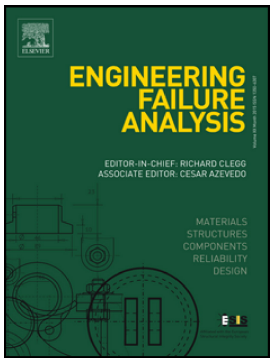

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Risk-based maintenance planning of subsea pipelines through fatigue crack growth monitoring

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Abstract

Research and development in the field of risk-based maintenance of offshore structures has recently attracted large attention due to the significant level of accident risk and the cost associated with maintenance in such remote facilities. The uncertainties associated with the deterioration of these facilities require a sound decision making methodology for maintenance planning. This paper presents a dynamic risk-based methodology for maintenance scheduling of subsea pipelines subjected to fatigue cracks. The developed method can assist the asset managers to select the optimum approach for mitigating the consequences of failure while minimizing the maintenance costs. A Bayesian network is developed to model the probabilistic deterioration process and then it is extended to an influence diagram for estimating the expected utility of each decision alternative. Observation of damage state is included in the model to enhance decision making capacity. To demonstrate the applicability of the methodology, three cases with different fatigue crack incidents on a pipeline are considered. Based on the monitoring results, the model is able to determine whether the maintenance should be performed or not. The economic risk associated with maintenance is also minimized by suggesting the optimum maintenance technique among multiple possible methods such as welding or major repair.

Keywords:

Risk-based maintenance, Fatigue Crack, Subsea Pipeline, Bayesian Network, Influence Diagram