Risk based structural integrity management of marine platforms using bayesian probabilistic nets - DTU Orbit (17/12/2018)

Risk based structural integrity management of marine platforms using bayesian probabilistic nets

The present paper introduces a general framework for integrity management of offshore steel jacket structures allowing for the risk based planning of inspections and maintenance activities with a joint consideration of various relevant deterioration and damage processes. The suggested approach relates the relevant deterioration and damage processes to damage states, which in turn may be related to the overall integrity of the jacket structural system as measured through the reserve strength ratio. Each state of degradation, irrespective of the cause, can then be assessed in terms of their impact on the annual probability of failure for the structure. Based on data and subjective information regarding the annual probabilities of occurrence of the relevant deterioration and damage processes, together with a probabilistic modeling of the quality of condition control, it is possible to assess the structural effect of each type of deterioration and damage phenomenon. This facilitates the development of a general framework for risk based integrity management. In the present work such a framework is formulated using Bayesian probabilistic networks for evaluating the time varying global structural reliability of jackets subject to progressive deterioration of its members due to the combined effect of different sources of damage. In principle, system effects, i.e., the effect of damage in one element of the structural system on the capacity of other elements, can also be accounted for through a Bayesian probabilistic net; however, this is not considered in this work. © 2009 by ASME.

Keyword: Structural damage, Structural reliability, Bayesian networks, Dropped objects, Corrosion, Risk based inspection, Jacket platforms, Ship impact

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