عنوان مقاله:

Inspection Planning Of Fixed Offshore Platforms Using Second-Order Third-Moment Fatigue Reliability

محل انتشار:

نهمین همایش بین المللی مهندسی سواحل، بنادر و سازه های دریایی (سال: 1391)

تعداد صفحات اصل مقاله: 13

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خلاصه مقاله:

The awareness of fatigue degradation in metallic structures started in the mid 19th century with the occurrence of fatigue failures in the railway industry [1]. In later years, fatigue failure ofpentagon-type semi-submersible “Alexander L. Kielland" platform, caused an increased focus on fatigue problems in the offshore industry [2]. A detailed theoretical background for fatigue analysis is given by Almar-Naess 1985 [3], Gurney 1979 [4], Maddox 1991 [5], Suresh 1991 [6]and Dover & Madhav Rao 1996 [7]. More recently, fatigue crack growth has been studied by among others, Lassen 1997 [8]. Considering irregular nature of the sea environment, and different uncertainties involved in dimensions of structural members, evaluation of stress concentration factors in welded joints, possible dynamic effects and etc., usually a probabilistic method is used to analyze offshorestructures. Details of the structural reliability theory can be referred to Ang and Tang 1984 [9], Thoft & Baker 1982 [10], Madsen 1986 [11], Schnerder 1997 [12] and Mulches 1999 [13].In recent years, articles published in fatigue reliability of fixed offshore platforms had a remarkable increasing trend. Pillai & Prasad 2000 [14] formulated a procedure for fatigue reliability analysis for inspection strategy of fixed offshore platforms using the serviceabilitylimit state criteria. Siddiqui & Ahmad 2001 [15] studied fatigue and fracture reliability of TLP tethers under random loadings. In this research, fatigue reliability of TLP tethers are evaluatedusing two common methods, i.e. first order reliability method (FORM) and Mont Carlosimulation. A more detailed application of reliability methods in fatigue assessment of existing offshore structures can be found in Dalane 1993 [16] and Gerhard 2005 [17].In this paper, a second-order third-moment formulation is used to calculate fatigue reliability of components in a fixed offshore platform. To do this, mean, variance and third moment of the crossing limit state function are calculated by the use of second-order third-moment technique (as described in [18]). Then a three-parameter weibull distribution function is fitted to these values and fatigue reliability of components is calculated.

کلمات کلیدی:

Fatigue Reliability, Inspection planning, Second-Order third-Moment Technique