Quantification of Safety for Offshore Jacket Structures: A Performance Review of Particle Swarm Optimizer Algorithm for Reliability Study

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Abstract

Quantification of safety with focus on fatigue damage of an offshore jacket structure has been studied in the present work. FEM analysis of a jacket structure is performed using SESAM followed by Pushover and Fatigue analysis to study the variation of jacket loading and fatigue limit state of each structural member. The results from these analysis are used to formulate the fatigue limit state function. For quantification of fatigue damage, reliability study is carried out by formulating a constrained objective problem of the fatigue limit state. A Particle swarm optimizer (PSO) algorithm is then used to solve this optimization problem to predict the design points. The proposed method is an alternative to Monte carlo simulation (MCS) to solve global optimization problems effectively. Significant saving in time and computational effort has been obtained by the proposed method as compared to MCS.

References

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