



Stochastic Response of Offshore Platforms

X.M. Li

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This study represents a further development of the statistical quadratization method. In order to obtain more reliable results, a third order method termed the statistical cubicization method is proposed as an improvement to the linearization and quadratization methods. The fatigue damage of offshore platforms is also investigated and numerical results are presented.

In wave loading of offshore structures, non-linearities cannot be ignored, but can usually be linearized. However, the replacement of the non-linear system with a linearized system also introduces some inherent limitations.

A natural extension of the linearization is to replace the original non-linearity with an equivalent non-linear polynomial expansion. Where a polynomial expansion up to a quadratic order is used, the method is known as the statistical quadratization. The statistical quadratization method is further developed in this study.

In order to obtain more reliable results, a third order method, termed statistical cubicization method, is proposed as an improvement to the linearization and quadratization methods. The fatigue damage of offshore platforms is also investigated. Numerical results in terms of response mean, variance, skewness, kurtosis and fatigue damage are presented for both stiff and flexible fixed offshore structures. The results estimated by the proposed equivalent quadratization, cubicization methods and non-Gaussian probability distributions are in good agreement with those predicted by the simulation method.

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