

THE SIGNIFICANCE OF DYNAMIC RESPONSE
IN THE ESTIMATION OF FATIGUE LIFE

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ABSTRACT

The fatigue life of offshore structures is investigated under the conditions that dynamic response to waves is assumed to play a significant role.

The study emphasizes the variation of fatigue life as a function of the structural natural frequencies, the amount of modal damping and the extent of directional wave spreading.

The results may be used to assess the confidence bounds on fatigue life estimates that result from uncertainties in design stage estimates of structural natural frequencies, damping and wave spreading. The example of a single vertical cylindrical caisson is completed in detail. This example includes the explicit computation of wave radiation damping and hydrodynamic viscous damping.

A versatile single parameter wave spreading function is introduced and used to show the influence of wave spreading on fatigue for conditions varying from unidirectional to totally spread random seas.

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