Reliability of ocean structures—a problem in "penultimate extremes"

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Abstract

A variety of possible failure mechanisms threaten the integrity of "ocean structures" such as vessels and ocean platforms, ranging from fatigue-like damage arising from accumulation of continuously occurring small shocks to severe sudden damage from large wave impacts. After some brief general comments on common features of such problems, the talk will focus on the latter failure mechanism with particular reference to structural integrity of vessels in heavy seas.

In this context, damage can result from a continuing low frequency "wave-induced" stress component on the structure combined with a sudden large transient high frequency ("whipping") stress at instants of impact. The latter predominate at the very highest levels but damage can occur at lower levels, leading to an element of "penultimacy" in the distribution.

The talk will describe basic modeling and estimation of vessel structural reliability for operational periods and ship lifetime.