

I am currently revising and updating my book **Ship Structural Design**, published by SNAME in 1983. The old Chapter 4 dealt with loads on ships and was entitled “Wave Loads—Statistical, Dynamic, and Nonlinear Aspects”. The next page gives a listing of the Section titles. As can be seen, the chapter takes a “first principles” approach. The content is fundamental and mainly mathematical, and therefore is not out of date. But over the past 20 years there have been many new developments regarding loads on ships. I would like very much to find persons who are knowledgeable about these new developments and who would be willing to write new material for this chapter, and work with me to blend the old and new material into a unified and cohesive whole. Alternatively, if some of the new material is sufficiently different or extensive, it could be a separate chapter. In that case the contributor(s) would be listed as the author(s) of that chapter.

Some examples of possible new topics (with overlaps and by no means complete):

Design for extreme waves; critical design conditions; definition of equivalent deterministic loads for finite element analysis and ultimate strength analysis

Definition and use of a set of Dominant Load Effects corresponding to a target value of probability of exceedence, for use in reliability-based design

IACS loads and other regulatory loads

Loads on multi-hull ships

Loads due to ship motions (slamming, sloshing, etc.)

I would welcome multiple contributors, and so if you are willing to contribute one or more of these or other topics, please contact me directly (see letterhead).

SHIP STRUCTURAL DESIGN – current edition (1983)

OUTLINE OF CHAPTER 4

WAVE LOADS—STATISTICAL, DYNAMIC, AND NONLINEAR ASPECTS

4.1 BASIC ELEMENTS OF PROBABILITY

Probability Density Function and its Moments

Some One-Dimensional Probability Density Functions

Probability Density Function for Two Variables

4.2 RANDOM PROCESSES

Stationary and Ergodic Random Process

Auto-Correlation Function for an Ergodic Random Process

Frequency Analysis of an Ergodic Process: Spectral Density Function

Properties of a Narrow-Band Random Process

4.3 EXTREME VALUES: PREDICTION OF
THE CHARACTERISTIC EXTREME VALUE

Exact Evaluation of Extreme Values

Estimation of Extreme Values by Extrapolation of Measured Data

Estimation of Extreme Value from Observed Short-Term Extreme Values

4.4 STATISTICAL REPRESENTATION OF THE SEA SURFACE

Superposition of Regular Waves

Mathematical Representation of Ocean Wave Spectra

Two-Parameter Formulas for Wave Spectra

Relationship Between Wave Frequency and Significant Wave Height

Short-Crested Waves

Families of Wave Spectra

Duration of Sea States

Estimation of Most Probable Extreme Sea State

4.5 CALCULATION OF SHIP RESPONSE TO A RANDOM SEA

Linear Response Theory: Transfer Function

Calculation of Nonlinear Wave-Induced Forces

Calculation of Structural Response

Ship Speed in a Seaway

Results and Conclusions Regarding Nonlinear Response Analysis

Calculation of Extreme Value of a Nonlinear Response

4.6 CALCULATION OF DESIGN VALUE OF SHIP RESPONSE

Design Sea Method

Lifetime Weighted Sea Method

Summary