Estimation of Ship Long-term Wave-induced Bending Moment using Closed-Form Expressions - DTU Orbit (08/11/2019)

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A semi-analytical approach is used to derive frequency response functions and standard deviations for the wave-induced bending moment amidships for mono-hull ships. The results are given as closed-form expressions and the required input information for the procedure is restricted to the main dimensions: Length, breadth, draught, block coefficient and bow flare coefficient, speed and heading, and the sea state parameters HS and TZ. Extreme value predictions are performed based on a user-defined operational profile and takes into account non-linearities due to bow flare using a semi-empirical closed-form expression for the skewness. The effect of whipping is included by assuming that whipping and wave-induced responses are conditionally independent given Hs. The procedure is simple and can be used to make quick estimates of the design wave bending moment at the conceptual design phase and to perform a sensitivity study of its variation with main dimensions and operational profile.

General information
Publication status: Published
Organisations: Coastal, Maritime and Structural Engineering, Department of Mechanical Engineering
Contributors: Jensen, J. J., Mansour, A. E.
Pages: 41-55
Publication date: 2002
Peer-reviewed: Yes

Publication information
Journal: International Journal of Maritime Engineering
ISSN (Print): 1479-8751
Original language: English
Source: orbit
Source ID: 62437
Research output: Contribution to journal › Journal article – Annual report year: 2002 › Research › peer-review