Estimation of the Effect of Green Water and Bow Flare Slamming on the Wave-Induced Vertical Bending Moment Using Closed-Form Expressions

ABSTRACT: The effect of impulsive loads like slamming and green water on deck on the wave-induced bending moment is estimated by a semi-analytical approach. The impulse loads leading to transient vibrations are described in terms of magnitude, phase lag relative to the wave-induced peak and decay rate. These loads can be due to bow flare slamming, bottom slamming or green water loads as they all can be characterised by a short duration relative to the wave cycle. The magnitude of the bow flare slamming loads is estimated using accurate results from wedge-shaped sections, Zhao and Faltinsen (1993) and for green water loads the results from Buchner (1995) and Wang et al. (1998) are applied. The phase lag relative to the wave-induced peak and the decay rate are derived mainly from published experimental results, Sikora (1998). The results are given in closed-form expressions and the required input information for the procedure is restricted to the main ship dimensions: Length, breadth, draught, block coefficient and bow flare coefficient together with speed and heading. The formulas make it simple to obtain quick estimates in the conceptual design phase and to perform a sensitivity study of the variation of the ship's main dimensions and operational profile. The procedure is applied to three tankers of different length and to a high speed ferry sailing in restricted water. The results obtained are compared to results obtained by use of current classification rules.

General information
State: Published
Organisations: Maritime Engineering, Department of Mechanical Engineering
Pages: 155-161
Publication date: 2003

Host publication information
Title of host publication: Proceedings of the 3rd International Conference on Hydroelasticity in Marine Technology
Place of publication: Oxford, UK
Publisher: The University of Oxford
Source: orbit
Source-ID: 25607
Research output: Research - peer-review › Article in proceedings – Annual report year: 2003