A study on simple and accurate prediction method for ultimate hull girder strength calculation

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Summary

The objective of this paper is to develop a simple and accurate prediction method for the ultimate strength calculations of ship hulls subject to vertical bending moments. The method is based on a credible bending stress distribution over the hull cross-section presumed at the ultimate limit state. The accuracy of this method is demonstrated through comparison with computations obtained using more refined methods, such as nonlinear finite element method, intelligent super-size finite element method, and idealized structural unit method. Statistical analysis of the hull girder ultimate strength based on comparisons among the various computations is carried out in terms of their mean values and coefficients of variation. The original Paik-Mansour method is found to be inapplicable to the case of a pure vertical bending moment depending on the ship's hull type and/or vertical bending direction, but the modified Paik-Mansour method is more general and is able to resolve this issue.