Deformation of designed steel plates: An optimisation of the side hull structure using the finite element approach

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Abstract	Thin-walled structures, which generally consist of unstiffened and stiffened plates, are widely used in engineering as one of the core features of any product or construction. Due to environmental conditions and working operation, the components of the structure una-voidably become subject to various types of loading. Deformation patterns and overall behaviour are expected to be varied, as different materials are considered in the structures. In this situation, assessments are required to quantify the responses and determine the relationships between the structural behaviour and structural para-meters. In this work, we attempt to obtain the behaviour data of unstiffened and stiffened plates as components of thin-walled structures. The material class - i.e. low-and medium-carbon steels - and loading parameters (i.e. type and angle) are taken as the main inputs in the finite ele-ment analysis. A geometrical design is adopted based on the side hull structure of a medium-sized tanker, for which two plate types, unstiffened and stiffened, are used. The results indicate that increasing the loading angle reduces the force experienced by the plate, while the greater the loading direction angle is, the greater the total displacement value will be. In terms of the plate design, the stiffener is observed to reduce the force expansion during the loading of the stiffened plate.
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