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Author: [ADVANCED](#) | Volume Page
Keyword: |



[TOP](#) > [Available Volumes](#) > [Table of Contents](#) > Abstract

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Development of the ISUM Element for girder webs and its application to double bottom structures

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Summary: The Idealised Structural Unit Method (ISUM) is known as a simple and efficient method to simulate buckling/plastic collapse behaviour of structural systems. Over the past few years, several studies have demonstrate that ISUM can be applied to collapse analyses on continuous stiffened panels under combined thrust and lateral loads and ship's hull girders under longitudinal bending and have validated the accuracy of ultimate strength calculated by ISUM. Therefore, it is considered that the next step for ISUM is to apply it to collapse analysis of the structures composed of girders such as double bottom structures. In this paper, the ISUM elements that can represent the collapse behaviour of girder webs are newly developed and the collapse analysis of double bottom structure is conducted using the developed ISUM elements. Through a comparison of the calculated results with those by large-scale nonlinear FEM analysis, high computational efficiency and sufficient accuracy of ISUM are demonstrated.

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