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Ultimate limit state design technology for aluminum multi-hull ship structures (Conference Paper)

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Abstract

The present paper is a summary of recent research and developments related to some core ultimate limit state (ULS) technologies for design and strength assessment of aluminum multi-hull ship structures, jointly undertaken by Pusan National University, Virginia Tech, U.S. Naval Surface Warfare Center and Alcan Marine. An extensive study on the subject has been undertaken by the authors theoretically, numerically and experimentally. Methods to analyze hull girder loads I load effects, stiffened panel ultimate strength and hull girder ultimate strength of aluminum multi-hull ship structures are developed in the present study. Application examples of the methodologies for the ULS structural design and strength assessment of a hypothetical 120m long all aluminum catamaran fast ship structure are presented. Important insights and conclusions developed from the present study are summarized. Some of the comparisons have shown that 5383 called Sealium (a patented Alcan Marine alloy) is superior to the standard aluminum alloy 5083 in terms of material properties, ULS characteristics and welding performance. It is our hope that the methods developed from the present study will be useful for ULS design and strength assessment of aluminum multi-hull ship structures.

Indexed keywords

Engineering controlled terms: Aluminum castings; Beams and girders; Hulls (ship); Machine design; Marine engineering; Naval architecture; Research and development management; Welding

Engineering uncontrolled terms: Design technology; Material properties; Multi-hull ship structures; Ultimate limit state (ULS)

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