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Crashworthiness assessment of naval structures subjected to a variety of maritime accidents, Part I: hard grounding

Ship grounding still possibly takes place even though attempt to improve structural safety is conducted. This situation leads to sustainable research to estimate structural consequences during a naval structures experiences accidental event, such as collision and grounding. Pioneer works in this field have considered conical and prism indenters as idealization of the seabed. However, possibility to contact with reef-shaped has not widely used as assumption for grounding action. In this work, hard grounding is considered, and reef geometry is selected as the indenter for composed scenarios. Before grounding analysis is performed, configuration and setting of the numerical method are verified by benchmark particular of a scaled panel experimental test. The naval structure is idealized based on double bottom structure of a non-ice class chemical tanker using thin-walled concept in finite element method. External parameters represented by impact location and striking velocity are embedded on the model to compose several scenarios. Results indicated that higher structural crashworthiness is shown by longitudinally strengthened component on the double bottom. Structural breaching during underwater impact with waterway side produces very high energy, and furthermore it concludes that resistance of the side part of the double bottom is recorded as the best.

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