

Abstract

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Hazard Identification and Probabilistic Scenario Selection for Ship-ship Collision Accidents

In collision risk-based design frameworks it is necessary to accurately define and Select a set of credible scenarios to be used in the quantitative assessment and management of the collision risk between two ships. Prescriptive solutions and empirical knowledge are commonly used in current maritime industries, but are often insufficient for innovation because they can result in unfavourable design loads and may not address all circumstances of accidents involved. In this study, an innovative method using probabilistic approaches is proposed to identify relevant groups of ship-ship collision accident scenarios that collectively represent all possible scenarios. Ship-ship collision accidents and near-misses recently occurred worldwide are collated for the period of 21 years during 1991 to 2012. Collision scenarios are then described using a set of parameters that are treated individually as random variables and analysed by statistical methods to define the ranges and variability to formulate the probability density distribution for each scenario. As the consideration of all scenarios would not be practical, a sampling technique is applied to Select a certain number of prospective collision scenarios. Applied examples for different types of vessels are presented to demonstrate the applicability of the method.