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

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[\[PDF \(739K\)\]](#) [\[References\]](#)

A Study on a Method for Maintenance of Ship Structures Considering Remaining Life Benefit

[Yasumi Kawamura](#)¹⁾, [Masanobu Nishimoto](#)²⁾ and [Yoichi Sumi](#)¹⁾

1) Yokohama National University

2) Aisin Seiki Co., Ltd.

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Summary: The failure of ship structures usually causes serious disaster such as human loss or oil spill from tankers that may cause catastrophic environmental destruction by the pollution of the sea. To avoid such casualties and disasters, it might be necessary to make a proper maintenance plan for the ship by rationally evaluating the condition of the ship structures. However at present, the strategy of maintenance of a ship structures varies by different ship-owners. Some ship-owners may well maintain the ship structures and operate it over a long duration. Whereas other ship owners may leave a ship in bad structural condition without any repair action in order to reduce the maintenance cost from the economical viewpoint. From the rational point of view, it is possible to say that the strategy of the maintenance of a ship must be decided by considering both the allowable level of the safety and the cost of the maintenance. To overcome this problem, we propose a new method for rational decision-making of maintenance plan for an individual ship. In the proposed method, the Remaining Life Benefit (RLB) is computed considering the survey results and the risk of failure of the ship. Then, a proper maintenance plan can be selected by maximizing the RLB. In this paper, the formulation for evaluation of the cost and the risk is firstly presented. Secondly, calculation of the risk of failure based on the reliability analysis for hull girder strength is described in which deterioration of the structure by corrosion and fatigue is accounted for. Finally, examples of calculated RLB for a bulk carrier is displayed to show the validity of the proposed method.

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