

学位論文概要

Study on Optimal Design of Plate Structure Considering Several Optimization Methods

(複合的最適化手法を用いたプレート構造物の最適設計に関する研究)

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This thesis comprises seven chapters and briefly explained below. The descriptions of each chapter are explained in the following paragraphs.

Chapter 1: Introduction. Briefly, this chapter describes the information especially about optimization method that applied to ship structure. Two distinct types of optimization algorithms which are deterministic and stochastic algorithms and component of optimization model explained in this chapter.

Chapter 2: Literature review. This chapter provides the previous study related research work in ship structural optimization.

Chapter 3: Aim and Objectives. The research motivation including the objectives and novelty are described in this chapter.

Chapter 4: Structural optimization of stiffener layout for stiffened plate using hybrid GA. This chapter describes the hybrid Genetic Algorithm (GA) technique to solve the optimization problem of the stiffened plate. To reduce the computational burden, the design variable divides into discrete and continuous. And also, to get an accurate estimation of the maximum displacement, the plate deformation was classified into global and local displacement which this is a new finding in this study.

Chapter 5: Optimal design of hatch cover considering material selection by genetic algorithm. This chapter applied material selection process as a new application in ship structural optimization in order to reduce weight and cost. In this study, genetic algorithm and size optimization was proposed as the optimization method. Pareto approach also used to find the best optimal solution.

Chapter 6: Optimal design of hatch cover via a three-stage optimization method involving material selection, size, and plate layout arrangement. This chapter continued from chapter 5 which in this study, a new optimization method was introduced. Layout optimization was expected to provide suitable plate layout of the top and bottom of the hatch cover.

Chapter 7: Optimal design of hatch cover to minimize the material cost of the plate structure considering material selection via up and downgrade methods. This chapter improves the material selection process in chapters 5 and 6 to reduce computational time and easy process.

Chapter 8: Conclusion and recommendation. This chapter summarizes the new findings obtained in this study. Finally, the recommendation for improvement of future study in this field is also provided.