

A Study on Optimizing the Structures which Set the Number of Member Subjects and Plate Thickness to the Design Variable

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The optimization of the ship structure is important for the design of ship. The low cost ship design can be made by optimization of the ship structure. Since the number of them is changed during the optimistic process, it happens that a new member subjects is created and added in to the ship structure. The optimization of the ship structure with the allocation of member subjects is considered by a new calculation method in this study.

FEM analysis is required for the strength assessment of ship structure. The models need some nodes at the allocation of member subjects as a characteristic of FEM. When the number of member subjects changes the process of the optimization of the structure, number of nodes of FEM model is also changed. Therefore, in order to ensure consistency of mesh, it is necessary to remake FEM model. The FEM model of the ship are large scale and very complexity. Therefore in order to ensure consistency of mesh, it is difficult to modify the FEM model of the ship. The optimization of the structure need to examine the proposition for design of many numbers. Creating FEM model of ship needs a long time. Also, FEM analysis needs high computing effort. therefore it is difficult to create and analyze the proposition for design of many numbers in restricted time.

For these reasons, the optimization of the structure which set the number of member subjects to a design variable is not performed generally. Therefore, the calculation method that doesn't depend on the number of member subjects and the allocation of member subjects is developed. The value of the displacement and stress in consideration of the influence of member subjects is acquirable by this calculation method. It will not be necessary to remake FEM model and annualize a whole structure using this calculation method. Add times Computational effort is limited to the calculation of only the structural modification by this calculation method. So, the optimization time can be shortened very much. The optimization of the structure is considered with the allocation of member subjects and the number of member subjects. The optimization of the structure can be performed by this calculation method. Also the analysis time can be shortened by proposed calculation method. The result of the calculation using this calculation method corresponds with the result of FEM. As a result, the acceptability of this calculation method is argued.