Study on Optimization for Large Structures using Hybrid GA

Ryota Nonami[1], Mitsuru Kitamura[2], Akihiro Takezawa[3]

[1] Hiroshima University, Graduate School of Engineering email:d130069@hiroshima-u.ac.jp
[2] Hiroshima University, Graduate School of Engineering email:kitamura@hiroshima-u.ac.jp
[3] Hiroshima University, Graduate School of Engineering email:akihiro@hiroshima-u.ac.jp

Abstract

A lot of stiffeners are attached large structures. The optimization of the structure with design valuable of number and position of stiffeners is difficult. Because there are problems with creating FEM model and optimization method. When the number of stiffener is changed, FEM model is recreated. As a result, the time for optimization is increase. Therefore, a calculation method for evaluation of the structure's strength without recreating FEM models by the change of the design is proposed. The optimization time is curtailed using this calculation method.

Also, this optimization is combinational optimization problem. Therefore, the genetic algorithm is used. However, when all design variable is expressed as strings, strings length becomes long. As a result, the convergence deteriorate and the calculation amount is increased. In order to solve this problem, the Hybrid GA which combined the genetic algorithm with the other optimization method is proposed. The structural optimization is performed using two proposed method.

Keywords: FEM, structural optimization, hybrid GA.