Figure 9 represents a summary of the ~~genetic algorithm~~GA performance in the function through optimization process. Randomly generated individuals in the population ~~expressing~~ indicate overturning moment and fluid c.g. height. The area constraint is defined to reduce the number of iterations in the production process and prevent producing inappropriate individuals in the population.

Accuracy of the ~~genetic algorithms~~GA method to determine the optimal cross-sectional area with the lowest overturning moment is compared to the normal method based on numerical analysis.

Analyzing ~~mutation~~ Mutation ~~rate~~Rate

This algorithm includes a large number of equations and different parameters such as iteration, maximum cost function, stopping criteria, and population ~~number~~. Getting the lowest iteration will be ~~important to achieve~~crucial for achieving the desired response. An unsuitable value for the mutation rate causes premature convergence and therefore does not get the best optimization response ~~optimization~~. To investigate the effect of mutation rate, cylindrical area and radius for optimization were considered 3.256 m^2 and 1.015 m, respectively [5]. Mutation rate according to figure 10, ~~is~~ was selected equal to 0, 3, 6, and 9 ~~represented in Figure 10~~. Without ~~mutation~~mutation rate, premature convergence ~~is occurred~~ occurs and the genetic algorithm will not be ~~possible to analyse~~able to analyze the best solution for the problem. Entering ~~some~~ random points in the population~~,~~ may be desirable to find a better choice in optimization. For zero mutation rate as shown in Figure 10, the program is rapidly convergent, and the best solution is obtained in 60 iterations and overturning moment of 1866 N/m. ~~3~~ Three percent~~age~~ mutation solution was obtained in 90 iterations and overturning moment of 1900 N/m. By imposing the mutation rate, ~~the~~ chances of new individuals in per population and generation for ~~being evaluated~~evaluation will increase. As a result, the mutation ~~rate prevent~~rate prevents local convergence ~~and average~~and average fitness value in every generation that increases with decreasing mutation rate. As shown in ~~Figure~~ figure 10, as mutation rate increases, convergence reduces and best mutation rates in genetic algorithm are between 4 and 6.

Further ~~explore~~ exploration ~~has been~~was performed to study the effect of the proposed ~~genetic algorithm~~GA by comparing ~~the~~ optimization results with numerical analysis [1]. To ~~Analyse~~analyze the genetic algorithm's output, overturning moment and rollover threshold of the optimized elliptical tanker were compared with those of the cylindrical tanker [1] and conventional elliptical tanker [3].

Comment [SMM۱۲]: منظور از این عبارت چیست؟

Comment [SMM۱۳]: کدامیک؟