Conclusions

6.1 Summary

In this work we have introduced a new operator for genetic algorithm which imitates the biological cloning process and have applied the integrated algorithm on a number of standard test cases. We have simulated the results for the standard GA as well as two new optimization methods obtained by integrating the new clone operator with the GA operators. The results of the three methods, namely proposed CGA method, proposed CEA method and standard GA, indicate that the former is capable of generating better solution quality than the other methods. It is seen that the CGA and CEA methods significantly improve the convergence rate and the quality of the solution. In conclusion, it can be said that the proposed operator reduces the number of searches within the solution space and enhances the convergence capability and the performance of the GA.

We also incorporated an innovative adaptive algorithm for changing the search limits of design variables with the integrated genetic algorithm. The proposed algorithm is tested with various case studies obtained from the literature and the results are presented. An analysis of the simulation results of the proposed SACGA method, considered in this work, leads us to the conclusion that the proposed SACGA exhibited good performance with respect to solution quality as well as the quality of the solution subspace searched.
6.2 Future work

The proposed SACGA algorithm tracks the solution by varying the limits either by expanding, shifting or shrinking. The bounds on each problem variable are redefined in an adaptive way, the present one shrinks as well as elongates even outside the initial limits and in turn the range of the limit increases or decreases accordingly.

Integrated algorithm has been applied on two Multiple Gravity Assist with single Deep Space Manoeuvre problems namely Cassini2 and Messenger. The results of the two methods, namely proposed CGA method and standard GA, indicate that the former is capable of generating optimal solution.

Further we have also introduced simulated annealing based probability conditions to accept offsprings for creating a new population in genetic algorithm and applied this algorithm on a number of standard test cases. We have simulated the results for the standard GA, SA and proposed SABGA optimization method obtained by integrating the selection operator with the GA operators. The results of the three methods, namely proposed SABGA method, GA method and SA, indicate better performance for SABGA. It is seen that the SABGA method significantly improve the convergence rate and the quality of the solution.

6.2 Future work

In this work, proposed algorithms for optimization are based on binary coding. The proposed method can also be analyzed using real coded GAs with specially designed operators and also be extended to higher dimensions. This will be considered in future work. The newly developed algorithms will be applied to some of the real life optimization problems. One of the problems is the prediction of re-entry time and location of the space debris objects.