

PhD RESEARCH FINDINGS

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PhD Topic: “**Dimensional Synthesis and Optimization of 1-F Six Bar Planar Linkages**”

PhD Research Findings:

This thesis presents the dimensional synthesis of six bar planar linkages using various optimization techniques. In the initial, to check the novelty of the optimization technique, four bar linkage are also designed.

The objective function is defined in terms of positional error between actual and desired points. Penalty functions are imposed for violation of two constraints, which includes sequence of crank angles and range of transition angle. Grashof's criteria is also checked before executing the optimization to refine the obtained results and expedite the convergence process.

Two optimization techniques, Particle Swarm Optimization (PSO) and Improved Harmony Search Algorithm (IHS) are implemented to synthesize the mechanisms. The case studies are selected from the literature and least error is found after comparing the results. They consumed also very less computational time.

In summary, the following conclusions were drawn.

- For the curves taken from the literature, a significant difference was observed between the errors of six bar Stephenson III mechanism, obtained using IHS algorithm and those reported in the previous literature.
- For the case of the self-generated problem, comprising quarter circle, the results revealed the better performance of IHS algorithm in path synthesis without prescribe timing case.
- The IHS algorithm has good convergence property, higher computational efficiency with better accuracy compared to the methods used in literature.
- Although, PSO is also suitable for six bar linkage synthesis, but it cannot converge in path generation problem without prescribed timing.