Annexure – I

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Title of the Thesis: **Hybrid Soft Computing Approach to Control of Nonlinear System**

### Abstract

There are many chemical and petrochemical process plants having multiple inputs and multiple outputs for different processes. This research mainly focuses on searching the optimal controller structure by increasing the controllers' integral performance criteria. It is very difficult to control the highly nonlinear quadruple four tank system. It is still a very big issue to control nonlinear systems. The proposed algorithm for tuning of PID constant is based on the new statistical approach combined with soft computing techniques. One of the optimization of statistical analysis is the Taguchi method to combine with mutation based Particle Swarm Optimization hybrid algorithm to tune the PID parameters. These tuning parameters optimize the performance indices of the nonlinear system. The tuning parameters of controller find optimal performance indices. It is a computer based nonlinear system for performance analysis and check validation of the proposed TMPSO algorithm. Laboratory experimental set up is established to communicate with MATLAB, LabVIEW and other controller platforms. It checks the performance indices based on the PID parameter tuning with proposed TMPSO algorithm and improve the response of different performance indices ISE, IAE, ITSE and ITAE for the nonlinear system. This PhD Thesis would be useful for the chemical process industry and safety of the equipment they used. It also improves the process performance and efficiency.

### List of Publications


