CHAPTER 2

2 Literature Survey

<table>
<thead>
<tr>
<th>Section</th>
<th>Page No</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1 Research Context</td>
<td>7</td>
</tr>
<tr>
<td>2.2 Inferences</td>
<td>14</td>
</tr>
<tr>
<td>2.3 Research Objectives</td>
<td>14</td>
</tr>
<tr>
<td>2.4 Organization of thesis</td>
<td>15</td>
</tr>
<tr>
<td>2.5 Summary</td>
<td>16</td>
</tr>
</tbody>
</table>
CHAPTER 2
LITERATURE SURVEY

A plenty of research works that deals with system identification are available in the literature. Among them, a handful of significant works are reviewed briefly in the section 2.1, inferences drawn from the targeted work presented in section 2.2, Research objectives presented in section 2.3, organization of thesis is presented in section 2.4 and finally summary of the chapter is presented in section 2.5.

2.1 RESEARCH CONTEXT

Vishwas Puttige et al. [27] proposed “Real time system identification techniques based on neural networks for a low cost UAV”. The advanced models were tested using the real-time HIL validation and demonstrated on the test flight.

Yung-Yaw Chen et al. [28] proposed “Frequency domain identification of servo systems with friction force” a system identification algorithm (SIDBE), was refined and successfully adapted to a precision servo system with intrinsic friction.

Yekutiel Avargel et al. [29] developed “suitable nonlinear system identification in the short-time Fourier transform (STFT) domain”. He introduced a flexible algorithm for the identification.

M.F.Rahmat et al. [30] proposed “Application of self tuning Fuzzy PID controller on industrial hydraulic actuator using system identification approach”. In This method modeling of actuator is successfully done and compared with conventional PID controller.

Evangelos G. Papadopoulos et al. [31] proposed “Analysis and model based control of servomechanisms with friction” In this method various friction compensating control techniques were implemented and compared experimentally.
Huawei CHAI et al. [32] proposed “A model reference adaptive control algorithm based on fuzzy neural network for some weapon Ac servo system”. This method blendes both fuzzy and sliding modal control and distinguished with accustomed sliding mode control which gave best accomplishment.

Shu-Shong Lu et al. [33] proposed “A new compensator for servo systems with position dependent friction”. In this method a new design procedure introduced and implemented for various friction force conditions.

Mustafa Reaa et al. [34] developed “Fuzzy boundary layer solution to nonlinear Hydraulic position control problem”. In this method The proposed scheme is applied and compared with conventional sliding mode control.

Bela Lantos et al. [35] proposed “Identification and model based compensation of Striebeck friction”. In this method new algorithms are introduced and experimented.

Lili Wang et al. [36] proposed “Time frequency analysis of nonlinear systems: the skeleton linear model and the skeleton curves”. In this method the skeleton linear model is developed for a nonlinear system. A new identification method based on non stationary vibration data is developed.

Wenle Zhang [37] presented “System identification based on generalized ADALINE Neural Network”. In this method an online identification method has been advanced.

Pierre Dupont et al. [38] designed “Single state elastoplastic friction models. In this method single stage friction models have been developed”.
M. A Chowdhury et al. [39] proposed “Variation of friction coefficient of copper with sliding velocity and relative humidity”. In this method the variation of friction coefficient” is discussed.

Bekir Sadık Ünlü et al. [40] presented “Determination of friction coefficient at journal bearings by experimental and by means of artificial neural networks method”. In this method friction coefficients at journal bearing determined experimentally and analyzed.

M. S. Kang et al. [41] proposed “straightness error compensation servo system for single axis linear motor stage”. In this method the exploratory conclusions represents as the intended compensation method is very adequate for improving the accuracy.

Yu-Liang Hsu et al. [42] presented “A dynamic nonlinear system identification using a wiener type recurrent network with OKID Algorithm”. In this method, the intended approach is able to identify the non linear system effectively.

Istvan Kollar et al. [43] explained the maximum- likelihood estimation of the parameters of linear systems and the properties of the estimator. The complex-domain description of the method, which results in much simpler expressions have been discussed. The method is also compared to other formations, giving more insight into the properties of the estimate. It turns out that robustness is at least partly due to the least-squares formulation.

P.T. Ahamed Seyd et al. [44] proposed “Time and frequency domain analysis of heart rate variability and their correlations in Diabetes mellitus “. In this method it can be able to find out the problems of patients as early as possible so that they can get better treatment.
G.Vandersteen et al. [45] proposed “Frequency domain system identification using arbitrary signals”. In this method it has been shown that the system can be identified properly by using arbitrary signals.

Xiaofeng Wu et.al. [46] proposed “Analysis of Output Frequencies of Nonlinear Systems”. He developed an algorithm in order determine the output frequency ranges of nonlinear systems.

Madhusudan Singh et.al. [47] proposed "Identification and control of a Nonlinear System using Neural Networks by Extracting the System Dynamics".

J. Fernandez de Canete et.al. [48] proposed “Artificial Neural Networks for Identification and Control of a Lab-Scale Distillation Column using LABVIEW” .In this method LABVIEW is used for identification.

Mao Xin-tao et.al. [49] proposed "Control strategy for pneumatic rotary position servo systems based on feed forward compensation pole-placement self-tuning method" In this method a control strategy is proposed and analyzed.

Chee Khiang Pang et.al. [50] have developed “Modal parametric identification of flexible mechanical structures in mechatronic systems. In this method a modal parametric identification method is used for linear-time-invariant flexible mechanical systems”.

Kemao Peng et.al. [51] have proposed "Modeling and Compensation of Nonlinearities and Friction in a Micro Hard Disk Drive Servo System With Nonlinear Feedback Control”.

Rizos, D.D., and Fassois, S.D [52] proposed “Friction Identification Based Upon the LuGre and Maxwell Slip Models".
Marton, L. et.al. [53] proposed “Control of Robotic Systems with Unknown Friction and Payload .In this method an algorithm is proposed and implemented for the control of systems”.

Xingjian Jing [54] proposed “Frequency domain analysis and identification of block-oriented nonlinear systems .In this method he studied generalized frequency response functions (GFRFs) and developed block-oriented nonlinear systems output spectrum”.

David Rijlaarsdam et.al. [55] proposed “Frequency domain based nonlinear feed forward control design for friction compensation”. He designed a controller for nonlinear systems by frequency domain based method. They showed that, optimally designing a friction control was easy and fast with frequency domain approach.

David Rijlaarsdam et.al. [56] presented “Uniquely connecting frequency domain representations of given order polynomial Wiener–Hammerstein systems “.

Panda Ganapati R et.al. [58] proposed “Identification of nonlinear systems using particle swarm optimization technique”, In this method a technique for Identification of nonlinear systems using particle swarm optimization is implemented and compared with other techniques and it has been shown that PSO is better.

Yamille del Valle et.al. [59] presented “Particle Swarm Optimization: Basic Concepts, Variants and Applications in Power Systems” .In this method basic concepts of PSO and various uses in power systems have been discussed.

AlRashidi M. R. et.al. [60] presented “A Survey of Particle Swarm Optimization Applications in Electric Power Systems” .In this method different Particle Swarm Optimization applications are analyzed.
Haosun et al.[61] proposed “Identification of structural models using a modified artificial bee colony algorithm”. An altered ABC algorithm is proposed and implemented for different structural models and analysis shown that the proposed technique has performed exceptionally.

Ozden Ercin and Ramazan Coban, [62] presented “Identification of linear dynamic systems using the artificial bee colony algorithm”. Here application of abc algorithm is analysed and successfully applied to dc motor identification.

H. Shayeghi, H.A. Shayanfar and A. Ghasemi,[63] presented “Application of ABC Algorithm for Action Based Dispatch in the Restructured Power Systems”. Here ABC algorithm is applied successfully to the power system applications.

H. Shayeghi and A. Ghasemi [64], presented “MOABC Algorithm for Economic/Environmental Load Dispatch Solution”. A new algorithm is developed and applied satisfactorily to economic dispatch problems in power systems.

Zary Forghany, Mohsen Davarynejad and B.Ewa Snaar-Jagalska [65] proposed “Gene Regulatory Network Model Identification Using Artificial Bee Colony and Swarm Intelligence”. Here, ABC algorithm is successfully applied for Gene Regulatory Network Model Identification and compared with other algorithms and has proven better.

Nadezda Stanarevic, Milan Tuba, and Nebojsa Bacanin [66] proposed “Modified artificial bee colony algorithm for constrained problems optimization”. Here a better ABC algorithm is advised for constrained problems.

Mustafa Sonmez [67] proposed “Discrete optimum design of truss structures using artificial bee colony algorithm”.
Dervis Karaboga and Bahriye Basturk [68] proposed “A powerful and efficient algorithm for numerical function optimization: artificial bee colony (ABC) algorithm”. Here ABC algorithm is distinguished with another techniques and has given best conclusion.


Yiming Yan, Ye Zhang and Fengjiao Gao [70] proposed “Dynamic artificial bee colony algorithm for multi-parameters optimization of support vector machine-based soft-margin classifier”. A dynamic ABC algorithm is proposed in order to solve optimization problems.

Cheng Jian Lin and Shih Chieh Su [71] proposed “Using an Efficient Artificial Bee Colony Algorithm for Protein Structure Prediction on Lattice Models”. An altered ABC algorithm is designed and implemented successfully to solve protein folding problems.

Zaki B. Nossair, A. A. Madkour, M. A. Awadalla and M. M. Abdulhady [73] proposed “System Identification Using Intelligent Algorithms”.

Ali Ozturk, Serkan Cobanli, Pakize Erdogmus and Salih Tosun [74] proposed “Reactive power optimization with artificial bee colony algorithm”. An ABC algorithm is advised for reactive power optimization and compared with pareto evolutionary algorithm and have given efficient results.
Guangzhou Chen, Jiaquan Wang and Ruzhong Li [75] proposed “Identification of parameters in Chemical kinetics using quantum behaved particle swarm optimization algorithm”. An improved PSO based identification technique is developed for the identification of parameters in chemical kinetics.

Radu Emil Precup et al. [76] presented “Evolutionary optimization-based tuning of low-cost fuzzy controllers for servo systems”. An optimization based tuning of low-cost fuzzy controllers for servo systems is presented.

2.2 INFERENCES

Assuming the linearity of intended system in frequency-domain identification is a genera process. Since, utmost all actuality systems are non linear in nature the linearity presumption may considerably abate the precision of the identified model. The altering friction effect is not considered in SIDBE identification algorithm, that in addition affords to the modeling error. Generally, raising the order of the recognized model can decreases the modelling error due to unmodelled dynamics at high frequencies. In this approaches computation time is also high.

2.3 RESEARCH OBJECTIVES:

The objectives of this research work are as follows:

1. To develop a hybrid technique for identification of servo system with friction force and compare with existing technique[28]

2. To develop an adaptive hybrid technique for identification of servo system with friction force compare with hybrid and existing technique[28]
3. To develop a PSO-ANN based hybrid technique for identification of servo system with friction force compare with hybrid, adaptive hybrid technique and existing technique[28]

4. To develop an ABC-ANN based hybrid technique for identification of servo system with friction force compare with hybrid, adaptive hybrid technique, PSO-NN based hybrid technique and existing technique[28]

2.4 ORGANIZATION OF THESIS

The Thesis organization is as follows:

Chapter 1 presents an introduction for System Identification & optimization techniques, motivation and problem statement.

Chapter 2 deals with research context or literature survey, limitations of existing system, Research objective of the thesis and organization of the thesis.

Chapter 3 presents a Hybrid technique for system identification by using the knowledge of Genetic algorithm and Neural Networks.

Chapter 4 presents an Adaptive Hybrid technique for system identification by using the knowledge of Modified Genetic algorithm and Neural Networks.

Chapter 5 presents a PSO-ANN based Hybrid technique or system identification by using the knowledge of Particle swarm optimization and Neural Networks.

Chapter 6 presents an ABC-ANN based Hybrid technique by using the knowledge of Artificial Bee Colony and Neural Networks.

Chapter 7 explains the conclusions and future scope.
2.5 SUMMARY

This chapter presents an overview of literature survey for nonlinear system identification and different optimization techniques by different authors and research objectives of the thesis work. System Identification using Hybrid technique is explained in the next chapter.