CHAPTER 61

TECHNOLOGY
INSTRUMENTATION AND CONTROL
ENGINEERING

Doctoral Theses

654. SHARMA (Deepali)
Intelligent Control of Hybrid Energy System
Supervisors : Dr. Prerna Gaur and Prof. A. P. Mittal
Th 22344

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1. Introduction 2. Literature review 3. Modeling of hybrid energy subsystems (Renewable energy sources and energy storage subystems) 4. Photovoltaic powered electric vehicle using pmsm drive scheme 5. Energy management system for A PV Assisted conventional vehicle 6. Comparative analysis of hybrid gapso optimization technique with GA and PSO methods for cost optimization of AN off grid hybrid energy system 7. Small signal stability analysis of a stand alone hybrid energy system 8. Main conclusions and scope of future work. References and appendix.

655. VIKAS KUMAR
Some Investigations on Artificial Intelligence Based Control of Servo Motor
Supervisors : Dr. Prerna Gaur and Prof. A. P. Mittal
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Abstract

Precise control of servo motors for force, torque, velocity and position becomes an essential requirement of the modern industries like robotics, machine tools, manufacturing tools and aerospace etc. The performance of the servo systems is influenced by the uncertainties due to parameter variations, external load disturbances, unmodeled and nonlinear dynamics of the controlled plant. The high precision control demand has led to the adaptation of intelligent control techniques as a powerful alternative to the convention control techniques as the conventional control techniques are not quite amenable to the solution under these uncertainties. In order to design the precise and the fast acting current controller for the servo systems, the model based finite state predictive current control is investigated for two level and three level inverters. A novel multiple objective optimization algorithm based on the fuzzy logic is developed and implemented successfully as an alternative to the conventional weighting factor based technique which is difficult to calculate as it requires the absolute importance of each objective function over another. PID controller being the most widely adopted controller in the industry is tuned using a novel cuckoo search based optimization algorithm. Also, the PID controller is created using mix locally recurrent neural

networks and is trained in an on line manner using a novel training algorithm. An on-line training algorithm is then employed to adapt to the process parameter variations. The robustness of the optimized PID controller and ANN based PID controller is tested against process parameter variations like rotor resistance, external load torque, moment of inertia etc. A neuro-fuzzy controller combines the advantages of both the fuzzy logic and neural network is designed using an on-line sequential learning algorithm for precision tracking and parameter adaptation.

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