

Open research issues on Deregulated Electricity Market: Investigation and Solution Methodologies

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Abstract - In this paper, a brief review on some of the interesting open research issues in the area of deregulated electricity market is made. To mention them, Power electronics application in power systems, machine design and location of distributed generation in the distribution systems are some.

Keywords – electricity market, deregulation effects, complex systems, equilibrium points.

Introduction

The special Issue “Deregulated Electricity Market: Investigation and Solution Methodologies” intends to collect original unpublished papers, aiming theoretical and practical matters, dealing with recent trends in power electronics, distributed generation and electrical machines. The abstracts of the accepted papers are as follows.

In paper [15], the emergence of deforming regimes is related to the proliferation of nonlinear electrical receivers based on power electronic components. The harmonic currents injected in the electric network can be evaluated using Discrete Wavelet Transform (DWT). Unlike Fast Fourier Transform (FFT) which provides only amplitude-frequency information and loses time information, DWT analyses the signal in a time-frequency domain using windows of variable duration, dependent on the frequency band; therefore reducing the computational effort and minimizing the spectral leakage. The operating mode of a static power converter as classic three-phase rectifier with diodes (TPRD) is compared in this paper with the modern rectifier with near sinusoidal input currents (RNSIC).

From paper [16], Distributed generation (DG), is the process of generating electricity from many small energy sources and connecting it directly to the distribution network. Determining the optimum location and sizing of distributed generation units is one of the major factors in the distributed network. For maximum power loss reduction, proper positioning and sizing of DG are ardently necessary. In this paper, a heuristic method which employs the plant growth simulation algorithm (PGSA) is proposed to determine the sizing of the distributed

generating unit and loss sensitivity factor is used in selection of the optimal location of DG. PGSA is a random search algorithm which is inspired by the growth of the plant. By simulating the growth process of plant phototropism, a probability model is established. Reduction of line losses in the radial distribution network is the main objective of this paper. The proposed method is applied to IEEE 10 bus system and IEEE 33 bus systems. The solution obtained by the proposed method has outperformed in the quality.

This paper [17] presents a simple method to control the neutral point potential (NPP) variations in three phase three level diode clamped multilevel inverters and also eliminate imbalance in the dc link. Phase Disposition (PD) PWM technique is used for generating the gate pulse for the switches. Two different controllers are used in this method. One for dc side control and the other is for load side control. The Performance parameters are analyzed for different controllers like PI controller and the Fuzzy Logic Controller and the comparison is summarized in the table. The Circuit is simulated in Matlab/Simulink and the effect of the Total Harmonic Distortion (THD) is analyzed. The simulation result confirms the effectiveness of this method to control the neutral point potential variation.

Finally, empirical studies adopting heuristic and artificial intelligence techniques share more light on the problem of multi-objective optimization in the field of emission control.

Paper [18] reports a study on multi-optimization for combining emission control while the work in [19] shows how to include economic constraints in controlling emissions by using AI/heuristic algorithms.

Conclusions

As the present electricity market is deregulated by means of policies, private service providers spend large amount of money in providing quality and reliable power to their customers. Many researchers have oriented their research towards harmonic studies, loss reduction techniques in distribution systems and various studies on machine design. All the above papers are emphasised in taking the power system to the next level of research and to make one's country a developed one.

Finally before diving into the collected research works [15-19], let us remember the reader that WSEAS Transactions on Systems has been hosting and will continue to do so a few Special Issues in the latest years [1-14]. This has the objective of creating an active and contributing research community around the journal and to present their latest efforts which have achieved wide interest among its members. As a reader of the journal you are invited to take inspiration by the presented papers and to consider submitting your future works to the journal itself.
Enjoy your reading!

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