3rd International Conference on Energy Systems and Technologies

ICEST 2015

16-19 Feb. 2015
Cairo, Egypt

ICEST 2015

Affiliation Listing of Submitted Abstracts

No.	Country	Abstracts
1	Egypt	**44**
2	Algeria	**2**
3	Bangladesh	**1**
4	Finland	**1**
5	Greece	**1**
6	India	**2**
7	Indonesia	**1**
8	Iran	**2**
9	Iraq	**1**
10	Kuwait	**1**
11	Libya	**2**
12	Malaysia	**1**
13	Nigeria	**2**
14	Saudi Arabia	**3**
15	Taiwan	**1**
16	Tunisia	**2**
17	UK	**1**
Total		**68**

ICEST 2015

Conference Sessions

Monday, 16 Feb. 2015

9:00 - 10:30	Registration and Opening Ceremony
11:00 - 13:00	Session KNR1
14:00 - 15:30	Session ETD
14:00 - 15:30	Session IET1
15:30 - 17:00	Session GBE
15:30 - 17:00	Session NET

Tuesday, 17 Feb. 2015

9:00 - 10:30	Session RET1
11:00 - 13:00	Session KNR2
14:00 - 15:30	Session EME
14:00 - 15:30	Session SMC1
15:30 - 17:00	Poster Session

Thursday, 19 Feb. 2015

9:00 - 10:30	Session IET2
11:00 - 12:30	Session RET2
12:30 - 14:00	Session SMC2
15:30 - 16:00	Session CS

ICEST 2015

Conference Abstracts Arranged by Receiving Date

1-

REFERENCE POINT BASED NEURAL NETWORK ALGORITHM APPLIED TO FUZZY MULTIOBJECTIVE ENVIRONMENTAL/ ECONOMIC DISPATCH PROBLEMS

A.A. Mousa[1, 2], B.N. AL-Matrafi Bart[1] and M.A. El Shorbagy[2]

[1]Department of Mathematics and Statistics, Faculty of sciences Taif University, Taif, El-Haweiah, P.O. Box 888, Zip Code 21974, Saudi Arabia,

[2]Department of Basic Engineering Science, Faculty of Engineering Menoufia University, Egypt

E-mail: a_mousa15@yahoo.com mohammed_shorbagy@yahoo.com

Artificial neural networks are massively paralleled distributed computation and fast convergence and can be considered as an efficient method to solve real-time optimization problems. Due to the massive computing unit-neurons and parallel mechanism of neural network, the large-scale optimization problem can be solved efficiently. In this paper, we propose reference point based neural network algorithm for solving fuzzy multiobjective environmental/economic dispatch (EED) problem. Our approach has two characteristic features. Firstly, the fuzzy EED problem is transformed to crisp multiobjective optimization problem C-MOP by means of Alpha-cut concept. Secondly a neural networks based reference point algorithm is implemented to solve C-MOP in such a way that they integrate the decision maker DM early in the optimization process instead of leaving him/her alone with the final choice of one solution among the whole Pareto optimal set. The target in such an optimization approach is to identify the Pareto-optimal region closest to the decision maker preference. Such procedures will provide the DM with a set of solutions near her/his

preference so that a better and a more reliable decision can be made. The validity of the proposed algorithm is illustrated on environmental/economic dispatch of the standard IEEE 30-bus 6-genrator test system. On the basis of the application, we can conclude that the proposed method can provide a sound optimal power flow by simultaneously considering multiobjective problem. Also, with a number of trade-off solutions in the region of interests we have argued that the decision-maker would be able to make a better and more reliable decision than with a single solution.

2-

ASSESSMENT OF SOLAR ENERGY POTENTIAL IN WESTERN REGION LOCATIONS OF SAUDI ARABIA USING THE ANALYTIC HIERARCHY PROCESS (AHP)

Said Ali ElQuliti[1], Hisham Alidrisi[1], and Ahmed Al-Garni[2]

[1]Department of Industrial Engineering, King Abdulaziz University (KAU), Jeddah, Saudi Arabia,

[2]Saudi Electricity Company (SEC), Saudi Arabia

E-mail: saidalihassan@yahoo.com

Saudi Arabia is a world-renowned country for high amounts of sunshine and a good climate, which makes it a great geographical location for solar energy use. Without doubt, the geographical location represents the key factor in determining the suitable site for solar power generation. Places that fit to the carefully chosen criteria may be best suited to the use of solar energy. Plenty of literatures are performed to study the feasibility of different alternative locations worldwide. However, all of them concentrated exclusively on the economic factors, and none of them demonstrated applications of quantitative tools to rank the different alternatives.

The main objective of this article is to design a suitable process for searching, assessing and ranking different locations for solar power plants. Fourteen site selection criteria are determined. The process starts with searching for suitable sites, implementing some feasibility criteria for the purpose of inspection, then vital screening criteria are used to reduce the number of the available sites, and finally the Analytic Hierarchy Process (AHP) is applied taking into account robustness testing to prioritize all the remaining sites. A full demonstration of the process is applied in the Western Region of Saudi Arabia as an actual case study.

3-

TRACKING THE HISTORY AND PERFORMANCE OF THE ENERGY CONSERVATION METHODS USED IN CREDIT AGRICOLE HEAD QUARTER PROJECT (CASE STUDY)

Mohamed Maher Hassan and Radwa Maher Amin

Hill International (North Africa)

E-mail: eng.mohamed69@gmail.com

Credit Agricole Head Quarter in Egypt is a complex office building when it comes to energy conservation matters. The building is certified LEED (Leadership in Energy and Environmental Design by Untied Stats Green Building Council) with Platinum rating.

The design and construction teams were aiming to enhance the Energy Efficiency of the MEP systems (Mechanical, Electrical and plumbing) and to reduce the energy building consumption and Carbon foot print (i.e. Green House Gases Emissions).

The important tools that aided the team on achieving such target were, Energy Modeling, Measurement and Verification, and Building Systems Commissioning, by interrelating all above methods; about the team was able to sustain an energy saving about 65% on cost basis. The study presents the methodology that took place during the process, it can be implemented on mega projects in Egypt, and meanwhile the country is suffering from the lack of energy resources.

4-

RISK-BASED MAINTENANCE SCHEDULING FOR POWER DISTRIBUTION SYSTEMS

Meysam Abbasi Sararoudi and Alireza Hatami Sharifabadi

Iran

E-mail: meysam.abbassi@yahoo.com

Growing the population and developing the cities make the power distribution systems really important and hard and continuing this process with acceptable quality to deliver have some hardness in cities traditional maintenance methods. By this reason giving the distribution system detail, managing them and using the structural system to do this job to gain benefits is really necessary. This process will called reliability centered maintenance. power distribution systems should be used with highest degree of reliability and lowest expense, so this situation make us to us newer strategies in repairing and keeping to better off the network and keep

expenses acceptable. Final aim is to make the situation and instruments better and long life with high in systems directly. The important point is with these instruments we should conduct the expenses in a reasonable way. This process wants to use a logical frame to reduce the complexity of repairing in this day's system with development of former strategies and make the keeping and repairing process so reliable, for achieving the first and important step is to have priority in repairing system. In this thesis we want to present a method base don analytical hierarchy process to maintenance in systems. In this method analytical hierarchy process (AHP) we have 4 stages: (1) Making the priority of the process: this will be done clear the main goal and making the properties of process so easy (if we need we can sub branch the scales) and finally make the exact decision. (2) Compare the couple scales in reaching the aim: in this stage we should define the scales and the compare couple by couple and clear the priority of scales. (3) Comparing the existing options like the previous stage we should compare the couples. (4) Make the options prior by their affect to the matter: in this stage we should measure all the option. With this measurement we can scale the final option by the formula. By this process we can reach the priority of fiders in maintenance different scale should be calculated in three operations: (1) observing and correcting small mistake (2) doing the main repairmen (3) cutting the trees in lines. The final aim of the research with dynamic programming and AHP comprised to determine the way of maintenance to have fewer prices in the job.

5-

NOVEL CARBOXYLATED POLY (GLYCIDYL METHACRYLATE) GRAFTED CELLOPHANE FOR PROTON EXCHANGE MEMBRANE FUEL CELL APPLICATIONS

M.A. Abu-Saied

Polymer Materials Research Department, Advanced Technologies and New Materials Research Institute (ATNMRI), City for Scientific Research and Technology Applications, New Borg El-Arab City Alexandria 21934, Egypt
E-mail: maabusaied@gmail.com

Carboxylated poly (glycidyl methacrylate) grafted cellophane for Proton Exchange Membrane Fuel Cell Applications have been prepared through two steps. The first step was introducing of epoxy groups to its chemical structure through grafting process with PGMA. Factors affecting the grafting process have been studied. The second step was converting the introduced epoxy groups to carboxylic group through a reaction with iminodiacetic acid. Factors affecting carboxylation process will be studied. Grafting and carboxylation processes were verified by IR spectrophotometric analysis (FTIR), Thermogravimetric analysis (TGA) scanning electron microscope (SEM) analysis Water uptake (W %), Dimensional changes (Δ A %) Methanol uptake. Essential characters required for polyelectrolyte fuel cell membrane especially ionic conductivity, methanol permeability, Ion Exchange Capacity (IEC), thermal stability and high mechanical properties were investigated. The thickness of grafted membranes was increased with grafting degree. The Ion Exchange Capacity (IEC) increase when the grafted membrane reacted with iminodiacetic acid. The methanol permeability of Carboxylated poly (glycidyl methacrylate) grafted cellophane which consider as essential character for polyelectrolyte membrane fuel cell application was found lower than that of Nafion membrane. The obtained results are very promising and opening new area for conducting further investigations considering the very low price of cellophane compared to Nafion.

Keywords: Grafted polymer, Fuel cell, polymer electrolyte membrane, cellophane,

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6-

ENERGY REFORM FOR WEST AFRICA IN CLIMATE CHANGE CRISIS ERA

Cecily Nwokocha, Raymond Kasei and Urias Goll
Physics Department AlvanIkoku Federal College of Education, P.M.B 1033 Owerri, Imo State, Nigeria,
Centre for Development Research, University of Ghana, Ghana, Department of Environmental studies, University of Liberia, Liberia.
E-mail: doncecily@yahoo.com

UNFCCC reports indicate that those who are least responsible for climate change are also the most vulnerable to its projected impacts. In no place is this more evident than in Sub-Saharan Africa, where greenhouse gas (GHG) emissions are negligible from a global scale. In Africa, energy demands could be the major factor that may lead to the increase of its emissions in the very near future. Forests are being lost for domestic energy, Oil produced energy increases carbon foot prints and Hydropower is unreliable due to uncertainties in rainfall patterns. By 2004, the energy consumption mix of West Africa was dominated by oil (58%) followed by natural gas (38%) and hydroelectric (8%) with coal and other energy forms not part of the mix. (Energy Information Administration, 2007). Rainfall and Global radiation using the Armstrong method was analyzed for sites in Nigeria and Ghana. A cost-benefit of the energy productions is presented.
Keywords: Energy; Reform; climate change; crisis; West Africa

7-

DOUBLE EXPOSURE PV-T SOLAR COOKER: MODELLING AND SIMULATION

Faouzi Nasri [1, 2], Chaouki Ali [1, 2], Rachid Nciri [1, 3], Kamel Rabhi[1, 3] and Slimen Attyaoui [1, 2]
[1]Laboratory of Electro-Mechanical System, National Engineering School of Sfax, B.P. W3038, Sfax, Tunisia,
[2]Faculty of Sciences Gafsa, Campus Universitaire Sidi Ahmed Zarrouk - 2112 Gafsa, Tunisia,
[3]higher institute of technological studies in Gafsa, Campus Universitaire Sidi Ahmed Zarrouk - 2112 Gafsa, Tunisia
E-mail: nasrifaouzi@yahoo.fr

Nowadays, the use of renewable natural resources of energy is an issue of debate. However, solar energys future is full of promises. A novel PV-T solar cooker was designed, fabricated and performance tested. The novel design consist mainly of three components: two parabolic reflectors, photovoltaic solar panel connected to a charge controller connected to the battery storage system, and an outer box type solar cooker consists essentially of two glass covers, a dark absorber plate exposed to solar radiation from the top and the bottom sides. The mathematical models of the PV-T solar cooker are developed and numerically simulated to predicting the behavior of the system. Tests and the measuring of temperatures variations have been carried out in the town of Gafsa-Tunisia
Keywords: Solar thermal energy; photovoltaic solar panel; solar cooker; modeling; numerical simulation; solar cookers.

8-

DEDUCTION OF TWO-DIODE MODEL PARAMETER FOR PHOTOVOLTAIC SYSTEM

Adel A. Elbaset[1], Hamdi Ali[2] and Montaser Abd-El Sattar[2]
[1]Department of Electrical Engineering, Minia University, El-Minia, 61517, Egypt
E-mail: AdeL.Soliman@mu.edu.eg
[2]El-Minia High Institute for Engineering and Technology, El-Minia, Egypt
E-mail: mymn2013@yahoo.com, hamdihesha@yahoo.com

This paper presents a proposed two-diode model for PV module to describe I-V and P-V characteristic curves at different weather conditions such as, temperature and solar irradiance. The two-diode model parameter represents an important role in design, manufacturing and performance of PV system at different weather conditions especially at low irradiance. Two-diode model parameters are estimated using Newton-Raphson method with the aid of initial values which are derived from basic equations of an equivalent circuit for two-diode model and manufacturing data sheet at standard test conditions. Newton-Raphson method is used to describe non-linear output characteristic curves of I-V and P-V. The proposed two-diode model is validated for multi-crystalline solar cell PV modules. Results are compared with the manufacturer's data sheet curves and the proposed

results of other published research works. The results of proposed model are validated with an excellent manner with respect to data sheet and other published research works.

Keywords: PV modules, Seven-parameter model, Two-diode model, One-diode model.

9-

LOAD-FLOW CONTROL AND VOLTAGE STABILITY ANALYSIS OF EGYPTIAN DISTRIBUTION SYSTEMS: A CASE STUDY OF A NEW CITY ELECTRICAL NETWORK

Ayman Awad, Ahmad Eid, Mamdouh Abdel-Akher and Salah Kamel

Electrical Engineering Department, Aswan University, 81542 Aswan, Egypt

E-mail:ahmadeid@gmail.com

One of the most crisis in Egypt is that the distribution voltage level is not stable and hence suffering from under voltage problems that could lead to partial blackouts. These problems arise from the extension of new cities and increasing of electrical demands on existing congested national grid. This paper presents a load flow study for electrical network of a new city in Upper Egypt. The study is performed using NEPLAN commercial software. The optimal capacitor placement (OCP), STATCOM, and Distributed Generation (DG) are used to control the voltage magnitude and improve the voltage stability of network. The new city electrical distribution system is a ring-type medium voltage network consists of 22-buses along with 20 distribution transformers of 22/0.4kV and two generators of 3.56MVA each. Three different load including commercial, industrial and residential types are modeled based on field data. The total load of the studied system is 7.14MVA. Different 24-hour simulation scenarios with control devices are used to compare and evaluate the obtained results.

10-

ENERGY TRANSMISSION AND DISTRIBUTION

Sameh Mousa Mohamed Ali Noufal

Egyptian Engineering Syndicate, Association of Energy Engineers (USA)

E-mail: sameh_nofal99@yahoo.com

Power distribution systems typically have tie and sectionalizing switches whose states determine the topological configuration of the network. The electric power distribution system usually operates in a radial configuration, with tie switches between circuits to provide alternate feeds. The system configuration affects the efficiency with which the power supplied the by substation is transferred to the load. Power companies are interested in finding the most efficient configuration, the one which minimize the power loss of their three- phase distribution systems.

The problem is combinatorial, which precludes algorithms that guarantee a global optimum. Most existing reconfiguration algorithms fall into two categories. In the first, branch exchange, the system operates in a feasible radial configuration and the algorithm opens and closes candidate switches in pairs. In the second, loop cutting, the system is completely meshed and the algorithm opens candidate switches to reach a feasible radial configuration. The algorithm described here based on heuristic rules and fuzzy mului objectives approach. The algorithm works with a simplified model of the power system and handles system constraints accurately. The algorithm starts with a radial configuration system and applying branch exchange moving towards a new radial configuration system to achieve real power loss reduction while satisfying system constraints. Multiple objectives are considered for load balancing among feeders and also to minimize the real power loss, deviation of nodes voltage, and branch current constraint violation, while subject to a radial network structure in which all loads must be energized. These four objectives are modeled with fuzzy sets to evaluate their imprecise nature and one can provide his anticipated value of each objective. Heuristic rules are also incorporated in the algorithm for minimizing the number of tie-switch operations. The proposed algorithm has been implemented in a MATLAP language program and using a Pentium-1096; computer achieving the global or near global solution in less than a second. The proposed algorithm is descried and then applied to test systems from literature. The effectiveness of the proposed method in both normal and emergency operating conditions is demonstrated through actual systems from Canal Company for Electricity Distribution (CCED).

11-

THE TECHNOLOGY OF FIBER OPTIC SENSORS

G. Slimani

Welding and NDT Research Centre (CSC). BP 64 Cheraga – Algeria BP 1037. Site Université Badji Mokhtar, Chaiba, 23000, Annab

E-mail: slimani_g@yahoo.fr

This work presents a study on new technology which is optical fiber sensors and their importance in various fields.

Despite the existence of electrical sensors used through many years in measuring physical and electrical phenomena but there are still problems such as transmission losses, susceptibility to electromagnetic interference (noise) ..... etc.. [1]. which makes them less efficient use. To solve these problems and saw the need for sensors in the industry researchers found that the most excellent solution is to be replaced by optical sensors that are now used in most systems, instrumentation as well as communication systems and control.

Keyword: A fiber optic sensor, optical fiber, waveguide.

12.

OPTIMAL OPERATION OF STAND-ALONE PHOTOVOLTAIC SYSTEMS WITH WATER PUMPS

Adel A. Elbaset[1], Ali H. Kasem Alaboudy[2] and Saad A. Mohamed Abdelwahab[2]

[1]*Department of Electrical Engineering, Minia University, El-Minia, 61517, Egypt,*

[2]*Electrical Department, Faculty of Industrial Education, Suez University, Suez, Egypt*

E-mail: AdeL.Soliman@mu.edu.eg, ali_hkasem@yahoo.com , saad.abdelwahab@suezuniv.edu.eg

The growing demand for electric energy throughout the world has highly motivated the use of renewable sources of energy. Among the unconventional renewable based energy sources that have been intensively studied, photovoltaic (PV) energy is now becoming a real promising and economical source of energy. PV is a technology that turns the sun radiation energy directly to electricity. The PV energy has many advantages. It is a clean energy source that has virtually no environmental polluting impact, highly reliable, flexible in terms of size, and needs minimal maintenance. Recently, with the mass production of PV modules, the initial cost is significantly reduced. The performance of the PV system depends on the variation of solar irradiation and ambient temperature. Compared to bulk grid connected PV plants, stand-alone PV energy systems can be widely utilized in remote areas where the electric utility grid is neither unavailable nor uneconomic to build. The technology of stand-alone PV systems promotes large sector of private project owners and small users to use such a clean source of energy.

Solar energy is the most low cost, competition free, universal source of energy as sun shines throughout. The steady state reduction of price per peak watt and simplicity with which the installed power can be increased by adding panels are attractive features of PV technology. Among the many applications of PV energy, water pumping is prominent. In developing countries they are used extensively to pump water from wells and rivers to villages for domestic consumption and irrigation of crops. A typical PV-powered pumping system consists of a PV array that powers an electric motor, which drives a pump. The water is often pumped from the ground or stream into a storage tank that provides a gravity feed. No energy storage is needed for these systems. PV powered pumping systems are widely available from agricultural equipment suppliers and they are a cost-effective alternative to agricultural wind turbines for desert areas water supply. Water pumping using PV technology is simple, reliable, and requires almost no maintenance.

Agricultural watering needs are usually more during sunnier periods when more water can be pumped with a solar system. PV powered pumping systems are excellent for small to medium scale pumping and there are thousands of agricultural PV water pumping systems in the field today throughout the world. PV powered water pumping systems are similar to any other pumping system, only the power source is solar energy. PV pumping systems have, as a minimum, a PV array, a motor, and a pump. PV water pumping arrays are fixed, mounted or sometimes placed on passive trackers (which use no motors) to increase pumping time and volume. AC and DC motors with centrifugal or displacement pumps are used with PV pumping systems.

In this paper, a PV array is used for water pumping purposes at remote or abandoned locations. Egypt is a developing country and largely depends on cultivation that won't be possible without water availability. Through this study, it can be proved that PV energy is an efficient solution for water pumping purposes in the Egyptian western desert area. In the PV based pumping system, the pump is driven by an electric motor matching both the selected PV array and the required pumping head. This paper presents a MATLAB/SIMULINK based modeling and simulation scheme suitable for studying the IV and PV characteristics of the PV array

connected with a water pumping motor. The purpose of this research is to examine all the necessary steps and key components needed to design and build a PV supplied water pump. The optimal operation of stand-alone PV systems with water pumping will be tackled. Further, the paper will present estimation for the PV total power and capital costs based on the irrigation method and the type of implants in the region. The proposed model is very useful for PV engineers and experts who require a simple, fast and accurate PV simulator to design their systems.

13-

FAULT CURRENT COEFFICIENTS DETERMINATION OF UNSYMMETRICAL FAULT FOR MICROGRID ADAPTIVE PROTECTION SYSTEM

Ali Bakr and Rashad M. Kamel
EETC, Assiut University, Egypt
E-mail: eng_ali_bakr@hotmail.com, r_m_kamel@yahoo.com

This paper concerns on detailed estimation of the fault current for the microgrid buses during grid-connected and islanding operating modes with different load types (i.e. dynamic or static loads), focusing on the unsymmetrical single line to ground fault considering the zero systems zero sequence and negative sequence impedances impact on the fault current coefficients which are critical for proper operation of a microgrid protection system based on voltage source and impedance method. The results of analytical fault analysis were carried out using fault analysis calculations package of MATLAB.

14-

ROLE OF ENERGY IN SUSTAINABLE URBAN DEVELOPMENT PLANNING

Sandip S. Deshmukh
BITS Pilani - Hyderabad Campus, Hyderabad - 500078, INDIA
E-mail: ssd@hyderabad.bits-pilani.ac.in

For the first time in human history, more than half the world's population lives in urban areas. Around the world, mega and super cities with tens of millions of inhabitants are rapidly expanding. In the UK, over 80% of the population already lives in urban areas, and the country is going through a new phase of urban development and regeneration that will affect the way we live for decades to come. There has been a renewed interest in urban planning throughout the cities due to increasing proportions of their population, production, and consumption become concentrated in urban areas. This has resulted in need for urban development patterns that are more sustainable from the point of view of energy and environment rather than to increase economic competition between cities. During the course of literature survey it has been observed that the world has seen an uncontrollable pace of urbanisation, and a consequent rise in energy demand for private and public consumption and for economic activities - leading on to greater emission of GHGs. This has led to an urgent need for the incorporation of energy sustainability issues to be included in urban planning. Todays cities faces deep challenges to achieving sustainability due their linkage to global markets for their energy, food, raw materials, consumer goods, and economic output, and these long-distance transactions generate significant GHG emissions. Cities pull resources from outside in far greater quantities than are available within their own geographic areas and generate waste streams that exceed their own carrying capacities.

The main aim of this paper is to review the scale and nature of urban planning development worldwide with specific reference to UK cities for meeting sustainable development goals. It has been observed that strategic land use plans during the 1990s have often been seen as tools to implement particular visions for the future of cities and linked to an economic change. Therefore, it has been argued that the urban planning in cities throughout the world is more oriented towards promoting the cities competitive advantage than achieving energy sustainability in it. The paper focuses on this aspect of urban planning process, in turn explores the way in which the renewed interest in strategic planning has to be stimulated by this competitive attitude. The paper highlights that there is need for greater awareness, and increase energy efficiency, and thrust towards appropriate energy efficient or environment friendly renewable energy technologies. Finally, the paper takes the view that this revival of strategic thinking is required to achieve the energy sustainability and in turn need for protection of environment by widening the role of renewable energy in urban planning.

Keywords: Renewable Energy, Sustainable Development, Urban Planning.

15-

ECONOMIC ASSESSMENT OF HYBRID RENEWABLE POWER SYSTEMS FOR THE MINING INDUSTRY

Joel Guilbaud
UCL Energy Institute (University College London), UK
E-mail: joel.guilbaud.11@ucl.ac.uk

The mineral sector is responsible for more than 38% of total industrial energy use and 11% of total final energy consumption. At the same time, the sector is coming under significant pressure to decrease the amount of energy consumed and greenhouse gases emitted. According to the fifth report of the carbon disclosure project, a rising trend in the industry is the search for cleaner, less carbon-intensive and more efficient energy technologies that can also bring new business opportunities to the industry.

A number of low carbon generation options have reached technological maturity and could potentially be implemented in the mining industry. While a large numbers of mines are located in areas containing large amount of renewable resources, few mining plants have already opted for these technologies. Compared with fossil fuels, renewable energies suffer from a number of technical and economical disadvantages such as intermittent supply and high capital costs. It is currently unclear whether those technologies can deliver economic benefits to the industry.

This study presents the results of an optimisation model that searches for the least-cost system with regards to optimal system size and optimal system configuration. A case study provides the results for Li-Ion batteries, non-tracking solar PV, and diesel power generation in a Chilean Copper mine. Hourly data are used for both the electricity demand of the mine and the total solar irradiance at mine site. A stochastic analysis is performed to take into consideration the variations of diesel costs. The results show that solar PV is an economically viable option under current market conditions while energy storage provides additional benefits for reducing diesel costs and economic uncertainty. It is argued that such technologies could provide new economic and environmental opportunities for the industry.

16-

APPLYING LEAN SIX SIGMA DMAIC METHODOLOGY TO IDENTIFY THE SIGNIFICANT FACTORS CAUSING DELAY IN CONSTRUCTION PROJECTS IN THE ELECTRICITY SECTOR - LIBYA

Ali Elebarkous
GECOL, Libya
E-mail: aalebarkos@gmail.com

The construction industry is one of the main sectors of the Libyan economy. The construction Industry (LCI) is an immensely important industrial sector in terms of economic and social impact and also employment facilities. Currently, the Construction Industry (CI) in Libya contributes 5.2 per cent of the Libyan Gross Domestic Product (GDP), and it employs around 3.2 per cent of the total manpower.

This paper will be presented how using lean six sigma Define, Measure, Analyse, Improve, and Control (DMAIC) Methodology used to determine and evaluate the most important and frequent factors causing delay in construction projects in the Electricity sector (GECOL) using. Through literature review, a comprehensive list of cause factors was determined, such, i.e., Improper project planning; Scheduling; and contractors financial difficulties - Inaccurate cost estimates, poor site management and supervision - Incompetent project teams.

A survey based on a questionnaire will be carried out among randomly selected such as project manager, project engineer and top manager in the General department of Projects in the Company to get their perception as to the significant of these factors in delay of Electricity projects. Then these data gathered will be analyzed using Lean six sigma DMAIC methodology and SPSS software to identify and rank the significant factors causing delay in Construction Projects in the Electricity sector Libya.

Keywords: Lean Six Sigma, DMAIC, Construction Project, Significant Factors, GECOL.

17-

TRACKING OF SOLAR PANEL BY HYDRAULIC SYSTEM

Shreekant Tare
S D I T S
Khandwa (India)
E-mail: shreekant30@hotmail.com

A Solar tracker is a device for orienting a solar photovoltaic panel or concentrating solar reflector or lens toward the sun. The sun's position in the sky varies both with the seasons (elevation) and time of day as the sun moves across the sky. Solar powered equipment works best when pointed at or near the sun, so a solar tracker can increase the effectiveness of such equipment over any fixed position, at the cost of additional system complexity. There are many types of solar trackers, of varying costs, sophistication, and performance.

In this paper titled Tracking of Solar Panel by Hydraulic System, it is being planned to design and fabricate a solar tracking system which will utilize mechanical energy for the tracking operation. At present, the solar tracking systems use electrical energy for tracking operations and this electrical energy for operations is supplied by same solar panels or by external electrical storage/supply lines, which reduces efficiency of the solar panels.

Using mechanical energy for tracking will increase the output of solar panels and removes the constraint on the location of the tracking system. The currently planned mechanical solar tracking system will use gravitational energy and manual energy for tracking.

18-

ADVANCES IN HYDROGEN ENERGY TECHNOLOGIES

Ammar M. Omar and Mohamed S. Saad
E-mail: nfd2003@yahoo.com

Hydrogen is being considered as a possible replacement of the fossil fuels. Hydrogen is not an energy source, but rather an energy carrier .It can be produced from any energy source, including the fossil fuels. Hydrogen can be used in any application where fossil fuels are used today. At the end use hydrogen is versatile and clean. A combination of renewable energy sources and hydrogen results in an energy system which can be permentlty satisfy all the energy needs of the modern civilization without damaging the environment. In the last two decades there has been a tremendous progress in hydrogen energy technologies, and in general acceptance of the hydrogen energy system concepts.

This technical paper illustrates the production process of hydrogen as well as the delivery to the end use. Technologies for hydrogen production and utilization already exists or more close to commercialization, and their directed demonstration and implementation is required which will eventually lead toward establishment of the hydrogen energy system. An energy system based on electricity and hydrogen as energy carrier, and coupled with renewable energy sources is a permanent energy system, capable of satisfying the energy needs of the future societies without causing detrimental environmental effects.

Hydrogen has many advantages over fossil fuel based energy currencies. It is Clean, versatile, efficient, and recyclable. We will never run out of hydrogen, as long as we have technologies to produce it and to use it. Technologies for hydrogen production and utilization already exist or are close to commercialization and their directed demonstration and implementation is required, which will eventually lead toward establishment of the hydrogen energy system. An energy system based on electricity and hydrogen as energy carriers, and coupled with renewable energy sources is a permanent energy system, capable of satisfying all the energy needs of the future societies without causing detrimental environmental effects.

Keywords: hydrogen energy system, hydrogen production, hydrogen utilization, fuel cells.

19-

APPLICATION OF SUPERCONDUCTING MAGNETIC ENERGY STORAGE (SMES) TO IMPROVE THE FREQUENCY FLUCTUATIONS OF POWER SYSTEMS CONNECTED WITH WIND ENERGY RESOURCES

Hossam S.H. Salama and Mohamed M. Aly
Electrical Engineering Department, Faculty of Engineering, Aswan University, Aswan 81542, Egypt
E-mail: Enghossam.salah@aswu.edu.eg, mmam72@gmail.com

With the direction of the world to search for renewable energy resources (RES), wind energy is considered one of the most dispersed RES. However, the random variation of wind speed can cause fluctuation in the

frequency and voltage of power systems. An energy storage system such as battery, flywheel, Superconducting Magnetic Energy Storage (SMES), etc. is very important to solve the problems of frequency and voltage fluctuations. The enforcement of SMES with wind energy has been expounded on several works but a few results aim to regulate the frequency fluctuation problem. SMES can improve the frequency stability of electrical power system during the sudden connection and disconnection of the load.

This work proposes the application of SMES to improve the frequency fluctuations of power system connected with wind energy resources. SMES has many advantages compare to other systems of energy storage such as batteries and flywheel. The most important of these advantages are: (i) very fast response, (ii) high efficiency, and (iii) long life time. The Wind turbine used in this work is of squirrel cage induction generator (SCIG) with shunt connected capacitor bank to improve the power factor.

SMES stores the energy in the form of magnetic field through DC current which passes through coil, thus electrical energy is converted to magnetic energy. SMES consists of step down transformer, power conditioning system, DC-DC chopper, superconducting coil, cryogenic refrigerator, and cryostat/vacuum vessel to keep the coil in the superconducting state. The control scheme of SMES is based on pulse width modulation (PWM), voltage source converter (VSC) and a two-quadrant DC-DC chopper using insulated-gate bipolar transistor (IGBT). Charging and discharging of SMES are determined by the chopper duty cycle, which is controlled by fuzzy logic controller (FLC). FLC was effective during steady-state and abnormal conditions.

The procedure of control is based on FLC to control the power transfer between the grid and SMES coil. FLC consists of: i) inputs which are controlled by users, ii) rules which are set by users to define the way of program process, and iii) outputs which are the results produced by processing the inputs. There are three stages of FLC. The first stage is fuzzification which converts crisp input values to fuzzy values. The second stage is the rules evaluation which constitutes the main part of the program. The third stage is defuzzification in which results are combined to give a specific crisp answer.

This work analyzing the application of SMES to minimize the frequency fluctuation in electrical power system with wind power penetration, the modeling of wind energy, SMES unit, and FLC were simulated by MATLAB/ SIMULINK and SIMPOWERSYSTEM package. In this work two inputs were applied to the FLC: system frequency and the differential system frequency. Each input has five sets of membership functions and one output; the duty cycle which has also five sets of membership functions. This technique of two inputs was found to improve the control performance where SMES can absorb/deliver active power from/to the distribution system. Reactive power can also, be delivered/absorbed to/from the distribution system.

The system used in this work is an infinite bus connected with load. The wind turbines and SMES were connected with the load bus. Wind energy consists of six turbines, 1.5MW each. The SMES used is 0.5H and 3000A rating. Load was disconnected for a period of one second and then reconnected to the system. Frequency was displayed without and with SMES. Constant, slow variable and fast variable wind speeds were assumed during the simulation process. The results obtained in this work show the effectiveness of SMES in mitigating the frequency fluctuation of the studied system under steady-state and transient conditions with the different variations of wind speeds.

20- TOWARDS A BALANCED ENERGY MIX FOR EGYPT

M.N.H. Comsan
Egyptian Energy Development Group, Cairo, Egypt
E-mail: comsanmn@gmail.com

Egypt is a fast growing country with 86.4 million population and annual per capita installed power 0.313 MW as of July 2014. Moderate to mature population and economic growth trends forecast population and annual per capita installed power to reach 99 millions and 0.644 MW, respectively by 2022; and 111 millions at per capita power of 0.941 MW by 2032. With these trends in consideration installed electricity generation capacity are forecasted at 64 GW by 2022 and 104 GW by 2032 as compared to the 2008 installed power of 22.6 GW. Meeting these demands is almost impossible using known limited national fossil fuel reserves. Current electricity generation policy exhausts about 65% of country's total fossil production. Crude oil consumption exceeded production starting from 2008, while gas reserves will be overstrained starting from 2022. Efficient utilization of energy resources regarding consumption, production and

exports/imports requires a major policy shift towards the use of non-fossil techniques for electricity generation. Although wind and solar power can be used efficiently on local scales, yet constraints characteristic of large scale utilization of these renewables show they cannot be used for large scale continuous base load electricity. Resources of hydropower are expected to be utilized completely by 2027. Hence an electricity generation strategy based on gas/coal and nuclear options is suggested. The strategy is based on gradual introduction of coal fired plats starting from 2017 and nuclear power from 2021. A nuclear share of ~ 8% and coal share of ~ 2.5% of installed power is targeted by 2032. The suggested mix is based on careful choice of fossil, nuclear, hydro, wind and solar power and is believed to be most appropriate to meet Egypt's energy needs by 2032.

21-

ASSESSMENT OF THE POWER QUALITY OF ELELCTRIC FERRO ALLOYS ARC FURNACE

Nagat Aly [1], Mohamed Ebeed [2], and Adel Z El Dein[3]

[1] Upper Egypt Electrical Distribution Company, Aswan, Egypt,

[2] Egyptian Ferro Silicon Alloys Company, Aswan, Egypt,

[3]Department of Electrical Engineering, Faculty of Energy Engineering, Aswan University, Egypt

Electric arc furnaces are nonlinear and time-varying loads, which cause power disturbances. This paper presents an analysis of the power quality of electric ferro-alloys arc furnaces by analysis of the results carried out at Egyptian ferro-alloys company (EFACO). The various electrical quantities like: harmonics, currents, and flicker etc. as well as the regarding power quality are measured and recorded at specific voltage buses; the same are compared with power quality standards**.**

Keywords: Power quality, arc furnace, harmonics.

22-

PUBLIC PERCEPTIONS TOWARDS NEW AND EMERGING ENERGY TECHNOLOGIES: A CROSS-COUNTRY PERSPECTIVE FROM STUDENTS AND TEACHERS CONCERNING BIOENERGY

Pradipta Halder

School of Forest Sciences, University of Eastern Finland, Joensuu, Finland

E-mail: pradipta.halder@uef.fi

Climate change and growing energy demand are two intertwined and immediate policy challenges for which solutions need to be developed and implemented urgently. Renewable energy (RE) technologies are considered as the most promising alternatives to fossil fuels as they can contribute to environmental, economic, and social development. Bioenergy is the oldest and most widely used RE in the world. However, the share of bioenergy in global electricity production is negligible. It indicates that the diffusion of modern bioenergy technologies has remained sluggish in both developed and developing countries. A sound understanding of public perceptions and attitudes of the new and emerging RE technologies such as the modern bioenergy technologies is crucial for implementing them successfully in our society. In this context, the emergence of innovative, informed and motivated young students is paramount in all countries as they are the key to build a sustainable future. Simultaneously, the roles of school teachers are also crucial as their perceptions and attitudes concerning bioenergy technologies could have an impact on their students psychological dimensions related to bioenergy. The study aims to find out students and teachers perceptions of bioenergy in Finland and India and also compares them to find out the similarities or divergences in an international context. Data have been collected from a number of high schools in India and Finland with a sample size of 50 science teachers and 585 high school students. Data analysis will be carried out by applying different statistical methods. The results are expected to generate a new body of knowledge in understanding the psychological dimensions of young generations and educators concerning bioenergy in an international level. It will have implications for bioenergy policy makers and environmental educators.

23-

DESIGN AND IMPLEMENT OF 100 KW ROOFTOP GRID CONNECTED PV SYSTEM: FACULTY OF ENGINEERING AS A CASE STUDY

M.S. Hassan and Adel A. Elbaset

Electrical Engineering Department, Faculty of Engineering, Minia University,

E-mail: m.salah@mu.edu.eg, Adel.Soliman@mu.edu.eg

Egypt is experiencing one of its most serious energy crises for decades. Power cuts in Egypt has escalated in recent years due to the shortage of fuel necessary to run power and over-consumption of loads

especially in summer season, which negatively affected various levels of social and economic activities. On the other hand, Egypt has some of the highest GHG emissions in the world. To solve problems of power cuts and emissions, Egypt government is taking impressive steps to rationalize consumption and optimize the use of electricity in addition to develop and encourage PV system projects that can be deployed on rooftop of institutional and governmental buildings. As a result, Egypt government intends to implement approximately one thousand of grid-connected PV systems on the roof of governmental buildings. The favourable climate conditions of Upper Egypt and recent legislation for utilizing renewable energy sources provide a substantial incentive for in! stallation of PV systems in Egypt. This paper presents a new approach for optimum design and implement of rooftop grid connected PV system installation on an institutional building at Minia University, Egypt as a case study. The new approach proposed in this paper based on optimal configuration of PV modules and inverters according to not only MPP voltage range but also maximum DC input currents of the inverter. The system can be installed on the roof of Faculty of Engineering buildings B and C. Five different types of commercially available PV modules and inverters have been used in this study. Many different configurations of rooftop grid connected PV systems have been investigated and a comparative study between these configurations has been carried out taking into account PV modules and inverters specifications. Energy production capabilities, cost of energy, simple payback time and GHG emissions have been estimated for each configuration using proposed MATLAB computer program. It was concluded that, the best configuration was Heliene 96M 420 solar panel and GCI-10k-LV inverter type with ten subsystems and 27 modules in each where each subsystem composed of 3 strings and 9 modules/string. Annual energy production of about 258.8 MWh with annual GHG emissions reduction of 180.9016 tons of CO2 that can be avoided from entering into local atmosphere each year. Cost for producing one kWh of electricity was estimated to be 0.5466 cents/kWh. System cost can be recouped in 6.958 years using SPBT calculations. Several advantages in applying grid connected PV systems on institutional or governmental buildings were found, some of these are the operational hours of office building coincide with the peak power production time of PV systems, and they do not require additional land use, since the building surface is used to accommodate PV modules on the roof. Also the education benefits that comes with owning buildings with PV system raises the awareness of students about renewable energy and energy efficiency issues, where the presented study would be useful and applicable for planning rooftop grid-connected PV installations in any other geographical location in Egypt.

24-

AN AC CURRENT LIMITING AND INTERRUPTING DEVICE FOR LOW VOLTAGE SYSTEMS

Saady Hasan[1], El-Sayed M. El-Refaie[1], Ali H. Kasem Alaboudy[2] and Abdallah. M. Hamada[2]

[1]Helwan University, Faculty of engineering, Dept. of Electrical Power and Machines, Cairo, Egypt,

[2]Suez University, Faculty of Industrial Education, Electrical Dept., Suez, Egypt

E-mail:abdallahmhe@yahoo.com

Recently, saving electrical energy is one of the most important fields in technical developments. It is needed directly or indirectly in almost every field. The increase in the demand and consumption of the electrical energy increases the levels of system faults. It is not possible to change the rating of the equipment and devices in the system or circuits to accommodate the increasing fault currents. Generally, electronic/electrical devices are sensitive to system disturbances or faults. System faults may cause permanent damage to the attached electronic/electrical devices, and hence device replacement becomes a necessity. The cost of equipment like circuit breakers and transformers in power grids is very expensive. Moreover, the device replacement process increases the power outage time requires experienced labor efforts. To protect the expensive equipment and devices in power systems from the increasing fault currents, Fault Current Limiters (FCLs) provide more cost-effective solutions to save such equipment and devices. Several solutions have been proposed in this context, including hybrid breakers with thyristors or gate turnoff thyristors (GTOs). The recent venue of the integrated gate-controlled thyristor (IGCT), with its new performance standards, opens up new perspectives in the field of hybrid switching techniques.

This paper investigates an useful novel technique to develop a hybrid current limiting and interrupting device (HCLID) which can be used successfully as an ultra-fast short-circuit protection means for low voltage

AC or DC industrial installations. The HCLID mainly consists of commutation circuit, fast mechanical contact switch and Zinc Oxide arrestor (ZnO); all are connected in parallel. The commutation circuit includes a single-phase half-controlled bridge-type scheme based on ultra-fast bi-direction semiconductor switch (IGCT) and an LC branch where the condenser is pre-charged. The use of semiconductor switches as the commutating switch affords reduced leakage current, reduced losses, improved reliability, and fast switching time (in μs). The current limitation facility in the presented HCLID is based on the forced current commutation principle. The mechanical switch will cost less since no current interruption is performed by the contacts of the mechanical switch. The mechanical contacts will not incur an arc while the forced zero current can be coordinated with the instant of contacts separation. Thus, an ultra-fast current interruption with no electric arc formation can be achieved. The integration of both mechanical breaker and static switch allows a combination of the formers current carrying capability and the latters high-speed arc-less interrupting characteristics. In order to keep the benefits of static interruption, an ultra-fast contact opening is required. Zinc oxide varistor are ZnO-based ceramic devices having highly non-linear current-voltage characteristics, similar to those of the back-to-back zener diodes. They are widely used as voltage clamping elements in many applications including solid-state circuit breakers, fault current limiting devices, active filters and other power electronic switching systems. During the FCLID operation, the varistor is subjected to repetitive pulses, and hence, it is required to have a high energy handling capability. Compared to SCR- based hybrid FCL type, the proposed technique that is based on self-turn-off IGCT devices is superior. It is smaller in size, better in dynamic performance, and simpler in the control approach and circuitry .Topology and control strategies of the proposal HCLID are described in the full paper version. Simulation results are conducted in PLECS (Piecewise Linear Electrical Circuit Simulation) and show that the proposed HCLID scheme is capable to limit and interrupt the fault current under different conditions. Finally, some possible applications of HCLID are also indicated.

25-

THE RISK OF RADON GAS IN CONTAMINATED SOIL AND CALCULATION THE LOWEST POSSIBLE COST DAMAGE

Abbas ali Mahmood Karwi and Eman Mohammed Abdullah,
Al-Furat Al- Awsut Technical University,
E-mail:abbas30032002@yahoo.com, eman_abdullah2001@yahoo.com

Groundwater contamination back to two main sources of natural pollution resulting from the dissolution of the rock components of metals consisting of rock aquifer, pollution of industrial output from human activities, all of which compromise the quality of the water, agricultural euphoria and result in its use of fertilizers and pesticides, as well as animal waste seeping through agricultural drainage water into the groundwater. The limited capacity of the self purification in the groundwater to reduce the negative effects of the various toxic pollutants, the cancerous effects on human and animal seemed to be obvious. And indicate those pollutants to the extent of sediment contamination of the water towards the aquifer, as well as to the fragility of the soil texture higher aquifer area characterized by high porous that allow for the passage of contaminants through without mitigate impacts vital operations in the unsaturated and saturated bands. The reasons for radioactive contamination in groundwater attributable output of radium from the melting of the aquifer rocks components, in addition to radon-222 gas, which is highly soluble in water. There radionuclide resulting from the decomposition of uranium and thorium granite and sedimentary rocks, which produces radioactive material due to the presence of sedimentary rocks of late cretaceous role of rich uranium, and scattered over a wide swath of the Middle East. Radon gas in soil is contributing to the outdoor and air pollution, and we regarding it as the main sources which affecting on population. Radon dose at higher soil levels of depleted uranium areas was detected. The ideal time of high dose for wells of depths 8-40 m was found, so the aim of this research is to reduce the risk of this gas to a minimum values and minimum damage costs.

26-

EFFECT OF ACTIVE THERMAL INSULATION ON METHANE AND CARBON DIOXIDE CONCENTRATIONS IN THE EFFLUENT OF A CATALYTIC PARTIAL OXIDATION REACTOR FOR NATURAL GAS CONVERSION TO SYNTHESIS GAS

A. Al-Musa, S. Shabunya, M. Al-Saleh, V. Martynenko, V. Kalinin

King Abdulaziz City for Science and Technology
E-mail: aalmusa@kacst.edu.sa

Abstract withdrawn by the corresponding author.

27-

DIRECT CONVERSION OF CARBONACEOUS FEEDSTOCKS TO ELECTRICITY IN A SOLID OXIDE FUEL CELL

Abdullah Al-Musa
King Abdulaziz City for Science and Technology
E-mail: aalmusa@kacst.edu.sa

This study explores strategies to develop highly efficient direct carbon fuel cells (DCFCs) by integrating a solid-oxide fuel cell (SOFC) with a catalyst-aided carbon gasification process. This system employs Cu/CeO2 composites as both anodic electrodes and carbon additives in a cell of the type: carbonCu-CeO2/YSZ/Agair. Particular emphasis is given to the combined effect of catalyst addition and carrier-gas type (inert He versus reactive CO2) on in situ carbon gasification and DCFC characteristics. The results indicate that cell performance is significantly improved by catalyst infusion to carbon feedstock and by employing CO2 as carrier gas. At 800C, the maximum power output is enhanced by approximately 40% and 200% for carbon/CO2 and carbon/catalyst/CO2 systems, respectively, compared with that of carbon/He configuration. These results can be primarily attributed to the pronounced effect of catalyst on carbon gasification through the reverse Boudouard reaction (C + CO2  2CO), and the subsequent in situ electro-oxidation of CO at the anode three phase boundary.

28-

EVALUATION OF VOLTAGE FLICKER EMISSIONS OF VARIABLE SPEED DFIG-BASED WIND TURBINES

Walid S.E. Abdellatif[1], Ali H. Kasem Alaboudy[1] and Ahmed M. Azmy[2]
[1]*Electrical Department, Faculty of Industrial Education, Suez University, Suez, Egypt,*
[2]*Department of Electrical Engineering Faculty of Engineering, Tanta University, Tanta, Egypt*
E-mail: walid.abdellatif@suezuniv.edu.eg, ali_hkasem@yahoo.com azmy@f-eng.tanta.edu.eg

The growing demand for electric energy throughout the world has highly motivated the use of renewable sources of energy. Among the unconventional renewable-based energy sources that have been intensively studied, wind energy seems to have a vital role in the near future. Over the last ten years, the global wind energy capacity has increased rapidly and became the fastest developing renewable energy technology. Basically, there are many reasons for using more wind energy within power grids. For instance, wind generation represents a clean and renewable source with minimal running cost requirements. Variable-speed wind turbine (VSWT) topologies include different generator/converter configurations, based on cost, efficiency, annual energy capturing, and control complexity of the overall system. The doubly-fed induction generator (DFIG) is the most commonly used device for wind power generation, The DFIG consists of a wound rotor induction generator (WRIG) with the stator directly connected to the grid, whereas the rotor is connected through a power electronic converter. The power converter controls the rotor frequency and thus, the rotor speed. This concept supports a wide-speed range of operation, depending on the size of the frequency converter. Typically, the variable speed range is about ±30% around the synchronous speed. The rating of the power electronic converter is only 25–30% of the generator capacity; which allows a variable-speed operation over a large, but restricted range.

The wind speed changes over moments, hours, days and seasons. Consequently, the output power from wind turbine exhibits high fluctuations due to wind speed variations, wind gradient and tower shadow effect, which cause flicker emission produced by grid connected wind turbines during continuous operation. One of the most important wind power quality considerations is the effect of voltage fluctuations, which disturb the sensitive electric and electronic equipment. This may lead to a great reduction in the life span of most equipment. Flicker has commonly considered as a serious drawback and may limit the maximum amount of wind power generation that can be connected to the grid. There are numerous factors that affect flicker emission of grid-connected wind turbines during continuous operation, such as wind characteristics (e.g. mean wind speed, turbulence intensity) and grid conditions (e.g. short circuit capacity, grid impedance angle, load type). The type of wind turbine also has an influence on flicker emission. The better performance of VSWT

is due to (1) the buffering effect of the back-to-back converter set, and (2) rotor speed flexibility that converts power spikes into speed variations. Although the variable-speed wind turbine produces lower flicker levels, the flicker study becomes necessary and imperative since the wind power penetration is continuously increasing.

In this paper, detailed models of variable speed DFIG-based wind turbines, control actions and the standard flickermeter according to IEC 61000-4-15 are developed to accurately evaluate the flicker emissions under different operating conditions. The DFIG is connected to the grid at the point of common coupling (PCC) via an ac-dc-ac back-to-back converter set. Two control schemes are developed for rotor- and grid-side converters. The control of the rotor side converter is developed to achieve maximum power point tracking (MPPT), while the control scheme of the grid side converter is designed to operate at unity power factor and stabilize the dc link voltage to its nominal value. The target is to investigate the fluctuations caused by variable speed wind turbine and the effect of site parameters (mean wind speed and turbulence intensity) and grid parameters (grid short circuit ratio and grid impedance angle) on voltage fluctuation. In addition, the performances of variable speed wind turbines and constant speed units are compared regarding the short-term flicker severity, Pst.

29-

FUZZY LOGIC CONTROL OF MODERN AIRCRAFT ACTUATORS

Reyad Abdel-Fadil, Ahmad Eid and Mazen Abdel-Salam
Aswan Faculty of Engineering-Aswan University
E-mail: reyad.mohamed2011@gmail.com

There is a general move in the aerospace industry to increase the amount of electrically powered equipment on future aircraft. This is generally referred to as the More Electric Aircraft and brings with it a number of technical challenges that need to be addressed and overcome. High power, electric actuation systems are being proposed on many new aircraft with ratings up to 50kW. The actuators are used to move flight control surfaces such as the rudder, aileron, spoiler, etc., in order to control the speed and direction of the aircraft during flight. The flying surfaces of civil aircraft are conventionally powered by hydraulic systems. In general, these systems are complex to install and costly to maintain. The concept of replacing the hydraulic system with electric actuation, coupled with changes to the electric generation technology and flight control systems, is commonly tanned the all-electric aircraft earlier studies have shown that the all-electric aircraft can give the aircrafts manufactures and operators considerable cost benefits, particularly due to reductions in system complexity and overall weight.

In this paper, the modern civil aircraft of Boeing 787 is modeled and simulated under transient and steady state operations. The fuzzy logic control (FLC) technique is used as a control method for the modern aircraft actuator system. FLC unlike conventional control methods is able to model inaccurate or imprecise models. The purpose of the paper focuses on the speed control of a DC motor representing the actuator using FLC. The performance of the aircraft actuator system is evaluated when using both PID and FLC control methods. The results with each control method are compared and demonstrated and it is found the superiority of using FLC especially during transient conditions.

30-

A DIRECT LABORATORY APPROACH TO THE STUDY OF ELECTROLYTIC CAPACITOR FOR ENERGY CONSERVATION

MUNTARI ABUBAKAR
Department of Basic and Applied Sciences, Colleege of Science and Technology, Hassan Usman Katsina Polytechnic P.M.B. 2052 Katsina, Katsina State, Nigeria
E-mail: muntarikankia@yahoo.com

Capacitor is an important electronic device which is used to store charges for later used. But most experiments designed to study capacitor use Resistor-Capacitor circuit (RC circuit) approach and are probably best perform to study the RC circuit itself after the concept of current has been introduced. In such experiment the capacitor is charged and discharge through the resistor. A device called charge pump which is used to charge, discharge and measure the charge on capacitor and also is used to verify the laws for capacitor combinations has been described and constructed. The results show that the charge on the capacitor is directly proportional to the potential difference between the plates of the capacitor. And also the experimental values of the capacitance were found to be approximately 3% greater than the manufacturer's value.

31-

InxGa1-xN-BASED MULTI-JUNCTION SOLAR CELL: MODELING AND PERFORMANCE ANALYSIS USING MATLAB/SIMULINK

Tajrin Akter, Md. Zubair Ebne Rafique, Md. Soyaeb Hasan, Md. Rafiqul Islam, Ibrahim Mustafa Mehedi and Abdulaziz Alshareef

[1]*Khulna University of Engineering & Technology, Khulna-9203, Bangladesh*

[2]*Bangladesh University of Engineering & Technology, Dhaka-1000, Bangladesh*

[3]*King Abdulaziz University (KAU), Jeddah, Saudi Arabia*

E-mail = rafiq043@yahoo.com

Performance of InxGa1-xN-based Multi-Junction Solar Cell (MJSC) having up to 8-junction is analyzed in this paper. An equivalent circuit based model has been developed using MATLAB/Simulink for InxGa1-xN-based MJSC considering the effect of tunnel junction. By using this model it is possible to analyze the behavior and characteristics of single junction to 8-junction solar cell specifically. An efficiency of more than 44% is achievable from InxGa1-xN -based MJSC with a short circuit current density of 6.95mA/cm2 and an open circuit voltage of 7.5V.

32-

ENERGY MANAGEMENT WITH CAPACITOR PLACEMENT FOR ECONOMICS LOW CARBON EMISSIONS USING MODIFIED MULTI-OBJECTIVE GREY WOLF OPTIMIZER

Al-Attar A. Mohamed[1], Ahmed A.M. El-Gaafary[2], Yahia S. Mohamed[2] and Ashraf M. Hemeida[3]

[1]*Faculty of Engineering, Aswan University, Egypt*

[2]*Faculty of Engineering, El-minia University, Egypt*

[3]*Ar-Rass College of Science and Arts, Qassim University, Saudi Arabia*

E-mail: engatar@yahoo.com

Energy efficiency, which consists of using less energy or improve service level to energy consumers. But its increasing pressure on the energy sector to control greenhouse gases forced the engineers to consider the emission problem as a consequential matter besides the economic problems. This paper presents a modified Multi-Objective Optimization algorithm inspired by hunting behavior of Grey Wolves (MOGWO). The meta-heuristic GWO algorithm in this paper extended to deal with multi-objective optimization problems. The proposed MOGWO is used to generate Pareto-optimal solutions for simultaneous reduce the gases emission level of harmful pollutants CO2 along with energy saving and minimization of generating cost. Moreover, fuzzy decision making process is employed to rank and extract the global Pareto-optimal solutions as the best compromise non-dominated solution. The effectiveness of the proposed methodology to determine the optimal location, number, and sizing of Flexible AC Transmission Systems (FACTS) devices tested on IEEE 30-bus, IEEE 57-bus and IEEE 118-bus standard systems have been evaluated. The generation and security constraints are incorporate in fitness function as penalty factors to achieve a valid and accurate solution, which all OPF variables remain within their permissible limits. The comparative study with other techniques demonstrates the superiority of the proposed approach and confirms its potential to solve the multiobjective EED problem. In addition, the extension of the proposed approach to include more objectives is a straightforward process.

Keywords: MOGWO; FACTS Devices; Environmental pollution emissions; Economical cost; Fuzzy-based mechanism.

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ENVIRONMENTAL/ECONOMIC DISPATCH USING MULTI-OBJECTIVE STATES OF MATTER OPTIMIZATION ALGORITHM

Al-Attar A. Mohamed[1], Ahmed A.M. El-Gaafary[2], Yahia S. Mohamed[2] and Ashraf M. Hemeida[3]

[1]*Faculty of Engineering, Aswan University, Egypt*

[2]*Faculty of Engineering, El-minia University, Egypt*

[3]*Ar-Rass College of Science and Arts, Qassim University, Saudi Arabia*

E-mail: engatar@yahoo.com

Energy resources Consumption by humans adds substantially to Environmental pollution emissions that contribute to climate change. In this paper, a modified algorithm based on the states of matter phenomenon extended to deal with multi-objective optimization problems and used to generate Pareto-optimal solutions for simultaneous reduce the gases emission levels of harmful pollutants (Nox, SOx and COx) along with generating cost. The effectiveness of the proposed methodology to determine the optimal location, number, and sizing of Flexible AC Transmission Systems (FACTS) devices with energy management of

generation units was tested on IEEE 30-bus system. Moreover, fuzzy decision making process is employed to rank and extract the global Pareto-optimal solutions as the best compromise non-dominated solution. The Contingency management problem as future energy needed and a single line outages problem have been solved successfully. A Comparative study between the proposed approach and other conventional techniques shows the superiority of the proposed technique in improving power system quality. The main feature of the algorithm refers to its accuracy and calculation speed that may yield a powerful solution to engineering problems.

34-

SCALABLE SOLAR TOWER FOR RURAL AREAS EXPERIMENTAL STUDY AND CFD ANALYSIS COMPARISON

Basil Abdel-Megied [1] and Mohamed El-Anwar [2]

[1]Visitor Researcher, Mechanical Engineering Dept., National Research Centre, Egypt

[2]Associate Professor, Mechanical Engineering Dept., National Research Centre, Egypt

Rural areas are in essential need for energy, and there is an obstacle to connect it with the national energy network. Consequently, a CFD model was implemented to investigate and evaluate the power gained from a mini-tower. On the other hand, experimental tower was built to find out real measurements to verify the CFD results.

The CFD model results were compared with experimental measurements and showed good agreement. Therefore, it is recommended to scale the experimental tower up, for higher energy gain.

35-

IMPROVEMENT OF GREEN HUMAN CAPITAL, GREEN ABSORPTIVE CAPACITY AND GREEN DYNAMIC CAPACITIES TO ACHIEVE GREEN SERVICE INNOVATION: AN ANALYSIS OF STRUCTURAL EQUATION MODELING (SEM)

Yu-Shan Chen and Yu-Hsien Lin

Department of Business Administration, National Taipei University, Taiwan

E-mail:byrantpitt@hotmail.com

This study explored the influences of green human capital, green dynamic capacities and green service innovation. The study sample was selected from top-500 manufacturing corporations for the year 2013 that were randomly selected as subjects. The data were analyzed using descriptive statistics and CFA. The results are as follows: First, the authors found that latent variables have good reliability, as well as discriminant and convergent validity. Global model analysis of green absorptive capacity yields acceptable results. Second, according to structural equation modeling analysis, the overall fit measures of the green absorptive capacity model scale passed the threshold standard.

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EFFECT OF ROCK POROSITY IN GEOTHERMAL ELECTRICITY POTENTIAL ESTIMATION OF RESERVOIR "Z"

Latifah Nurul Qomariyatuzzamami[a], Alamta Singarimbun[b]

[a]Department of Teaching Physics, Institut Teknologi Bandung, Jl, Ganesha 10 Bandung 40132, Indonesia

[b]Department of Physics, Institut Teknologi Bandung, Jl, Ganesha 10 Bandung 40132, Indonesia

The magnitude of geothermal potential is necessary to be estimated, to be used as reference value for the development of geothermal power plant. Rock porosity, fluid saturation, and production period are factors which contribute in the geothermal potential. This study was conducted to evaluate the effect of rock porosity in the estimation of the potential electricity of geothermal area "Z". Lumped parameter volumetric method was used to make the estimation. Fluid saturation in the "Z" area was assumed to be 0.3 and 0.7 for water and vapor saturation respectively, the rock porosity varied from 10% to 40% with 10% increments. The result of estimation for 25 years production with varied rock porosity from 10% to 40% were 180.1779 MWe, 175.1375 MWe, 170.097 MWe, 165.0566 MWe, 160.0162 MWe, 154.9758 MWe, and 149.9353 MWe respectively. The greater porosity of rock in geothermal area "Z" was, the lower electricity potential was obtained. The geothermal area "Z" is dominated by the heat of rock; high rock porosity causes the gained to be low.

***Keywords*:** electricity; geothermal; porosity; volumetric

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ENERGY FROM WASTE CASE STUDY (CO GENERATION PLANTS: - WEST OF EL- ZAWYA POWER STATION-LIBYA)

ALI FADIEL ALI and FARAG HAMDI

Libya

E-mail: senator..libya@gmail.com

Waste represents an increasingly important fuel source. Using waste as fuel can have important environmental benefits. It can not only provide a safe and cost-effective way of waste disposal but can also help reduce carbon dioxide emissions. Whilst energy can be derived from waste by burning Landfill gas, there are also alternative methods to generate energy from waste. When waste is incinerated in large amounts, the heat energy can be recycled and used to heat factories, hospitals and other large buildings. Alternatively, the heat can be used to generate electricity. This is done by using the steam created by combustion to drive a steam turbine. Electricity generating waste plants can typically process between 20,000 and 600,000 tons of waste per year, from which they can generate between 1 and 40 MW of electricity. Waste-derived fuel can also be burnt in boilers as an alternative to coal. Any energy that is recovered from biological waste can be regarded as renewable. It comes from plant material (either directly, or in the case of animal waste, paper or card, indirectly). As plants grow, they absorb carbon dioxide from the atmosphere. When biomass is used as fuel, this carbon dioxide is returned to the atmosphere, making the process carbon neutral. Waste-to-energy is the process of generating energy usually in the form of electricity or heat from the controlled combustion of solid wastes. Waste-to-energy is a type of energy recovery in which the energy from waste is harnessed, stored, and ultimately, recycled as heat converts to electricity.

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EXPERIMENTAL STUDY OF ENERGY SEPARATION IN COUNTER FLOW VORTEX TUBE

Mahmoud S. Ahmed

Associate Professor, Mech.Eng. Dep., Faculty of industrial education, Sohag University, Sohag, Egypt

E-mail: mahmoudsalem.ahmed@yahoo.com

The present paper investigates an experimental work to study the performance of manufactured counter flow vortex tube incorporated with set of generator nozzles of N = 2, 3, 6 and aspect ratio, AR = 1.4. The effects of inlet air pressure, hot tubes length to diameter and number of nozzles on the splitting air temperature are studied. The study includes evaluation of the COP for the cooling and heating processes. It is found that an optimum value of COPref = 0.24 as well as for COPHP = 0.3 are obtained. The findings encourage using the vortex tube in the applications of cooling and heating processes.

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LCL FILTER DESIGN WITH PASSIVE DAMPING FOR PHOTOVOLTAIC GRID CONNECTED SYSTEMS

KAHLANE Abd El Wahid Hamza, LARBESS Cherif, HASSAINE Linda

Centre de Dveloppement des Energies Renouvelables, CDER, BP 62 Route de lObservatoire, Bouzarah, 16340, Algiers, Algeria

E-mail: h.kahlane@cder.dz

Recently, the development of renewable energy technologies have been accelerating, making the simultaneous development of power conversion devices for applications, such as wind and solar power systems extremely important, the development of these technologies are actively underway.

The harmonics caused by the switching of the power conversion devices are the main factor-causing problems to sensitive equipment or the connected loads, especially for applications above several kilowatts, where the price of filters and total harmonics distortion (THD) is also an important consideration in the systems design phase.The inductance of the input or output circuits of the power conversion devices have conventionally been used to reduce these harmonics. However, as the capacity of the systems have been increasing, high values of inductances are needed, so that realizing practical filters has been becoming even more difficult due to the price rises and the poor dynamic responses.

An L filter or LCL filter is usually placed between the inverter and the grid to attenuate the switching frequency harmonics produced by the grid-connected inverter. Compared with L filter, LCL filter has better attenuation capacity of high-order harmonics and better dynamic characteristic.

However, an LCL filter can cause stability problems due to the undesired resonance caused by zero impedance at certain frequencies.

To avoid this resonance from contaminating the system, several damping techniques have been proposed. One way is to incorporate a physical passive element, such as, a resistor in series with the filter capacitor. This passive damping solution is very simple and highly reliable. However, the additional resistor results in power loss and weakens the attenuation ability of the LCL filter. This drawback can be overcome by employing active damping. This paper deal design methodology of a LCL filter topology to connect inverter to the grid, an application of filter design is reported with m-file in Matlab.

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BENEFITS AND COSTS SHARING THROUGH RES ELECTRICITY COOPERATION BETWEEN EUROPE AND THIRD COUNTRIES

Charikleia Karakosta*, Vangelis Marinakis, Aikaterini Papapostolou, John Psarras

National Technical University of Athens, School of Electrical & Computer Engineering, Management & Decision Support Systems Laboratory (EPU-NTUA), 9, Iroon Polytechniou str., 15780, Zografou, Athens, Greece

**E-mail: chkara@epu.ntua.gr*

European Union (EU) Renewable Energy Directive 2009/28/EC, on the promotion of the use of energy from renewable energy sources (RES), establishes a legal framework for cooperation between EU Member States and third countries in joint projects, regarding electricity generation from RES. A prerequisite to the acceptability of the project is that the electricity produced within the project must be consumed in the EU, enabling in parallel EU Member States to meet their 2020 RES targets in a more cost efficient way. Moreover, this may derive various potential benefits for both sides, including diversification of energy imports, knowledge and technology transfer, reinforcement of existing and new European relationships with third countries, new markets creation and business opportunities for European RES technology companies, as well as employment opportunities for third countries. BETTER – "Bringing Europe and Third countries closer together through renewable Energies" initiative supported by the Intelligent Energy Europe programme tries to address collaboration perspectives between EU and third countries on renewable energy. In this context, the main aim is to assess, through case studies, stakeholders' involvement and integrated analysis, to what extent cooperation with third countries may help Europe achieve its RES targets in 2020 and beyond, by triggering the deployment of RES electricity projects in third countries, creating synergies and as a result win-win circumstances for all involved parties. The case studies focusing on North Africa, the Western Balkans and Turkey investigate in detail the technical, socio-economic and environmental aspects of RES cooperation. BETTER final outcome is a fine-tailored policy package, offering a concise representation of key outcomes, guidelines for practical implementation of RES cooperation, action plans and policy recommendations reflecting regional specifics.

Keywords: Renewable Energy; Cooperation Mechanisms; Joint Projects; Barriers; Benefits; Policy Recommendations; Europe; Third Countries; North Africa; West Balkans; Turkey.

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PLANT INPUT MAPPING DIGITAL REDESIGN OF A PID CONTROLLER FOR A POWER SYSTEM DAMPING

Gaber Magdy

Faculty of Energy Engineering, Aswan University, Egypt

E-mail: gabermagdy100@gmail.com

The digital redesign technique is one of the most popular approaches to the design of digital controllers in industries. Which converting a good-designed continuous time controller to a digital controller suitable for digital implementation. In this paper, the Plant Input Mapping algorithm (PIM) is used for converting the S-domain model of the PID controller to a Z-domain model counterpart. The proposed digital PID controller is used to enhance the damping of a single machine power system. The proposed method is based on a transfer function from the reference input to the plant input, which called continuous time plant input transfer function CT-PITF. All the poles of the transfer function that need to be controlled must appear in the CT-PITF. The results obtained from the proposed digital PID controller more convergence to the CT-PID controller especially for longer sampling period where Tustin's method is violated. The proposed algorithm is stable for any sampling rate, as well as it takes the closed loop characteristic into consideration. The computation algorithm is simple and can be implemented easily. The proposed digital PID controller is successfully applied to the linearized model of a single machine infinite bus

system and the performances of the analog PID controller, Tustin's controller and the proposed digital PID controller are compared and their results are presented.

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ENHANCEMENT OF VOLTAGE PROFILE FOR UNBALANCED DISTRIBUTION SYSTEM WITH WIND ENERGY AND SUPERCONDUCTING MAGNETIC ENERGY STORAGE

Sayed M. Said and Ali Selim
Aswan University, Egypt
E-mail: sayed.said@aswu.edu.eg

Nowadays, great interest has been directed to new and renewable energy sources due to environmental changes and massive demand for energy with limited reserve of fossil energies. The demand of the energy increases due to the rising of the consumer's loads and limitation of natural energy resources. Several new generation and storage technologies have the potential to significantly impact power system performance. Wind energy generation system (WEGS) is one of the most promising renewable energy in the world; also wind power is the fastest-growing renewable energy source and poses the most immediate grid connection problems. Energy storage systems have gained increasing interest for use with wind and solar power plants. Superconducting magnetic energy storage (SMES) is one of the important energy storage because it has high efficiency, high power density, long life time, and very fast response. Also, SMES is becoming a preferable energy storage solution for wind power generation.

The impact of increasing the load demand during a day will cause increasing in the voltage drop that will effect in the performance of the voltage profile for the system so that it is required to create a voltage profile control system to overcome that drop in the voltage. In this paper WEGS is used to improve the voltage profile for three phase radial distribution system during 24 hours. The changes in the load demand and in the wind power during this specific time will cause the wind system not sufficient to improve the voltage profile because the wind speed during a day not fixed and that produce a variation in the power generated from the wind. So the improvement in the voltage profile will depended on the wind speed variation. Storage devices must be used to overcome this problem. SMES device is used in this paper to increase the ability of wind energy system in improving of voltage profile during 24 hours. SMES system consist of step-down transformer, power conditioning system (PCS), large inductance superconducting coil, and cryogenic refrigerator system to keep the coil in the superconducting state during all modes of operations. PCS used in this work is voltage source converter (VSC). DC-linked capacitor and DC-DC chopper. Fuzzy logic controller (FLC) used for DC-DC chopper to control the power transfer between the grid and SMES coil. The FLC is designed so that the SMES can absorb/deliver active power from/to the distribution power system. On the other hand, reactive power can be delivered/absorbed to/from the distribution power system according to the voltage difference between the SMES voltage and DC link voltage. Two inputs were applied to the FLC; wind speed variations and SMES current variations. This technique of two inputs was proved to enhance the control performance. SMES system and WEGS installed in the distribution system at worst voltage bus, during heavy loading cases and the wind power not enough to can carry all loads, SMES can discharge from its energy to help WEGS in enhancing the voltage profile of the system. On the other hand, when the power is free due to no loading in these periods, SMES can charge this energy and give the distribution system this energy during need it.

To show voltage profile during specified time a power-flow must be performed at various loading demand at each time. In unbalanced distribution system the forward/backward sweep method is used to calculate the load flow. The main advantage of the forward/backward method is avoiding the construction of massive augmented three-phase Jacobian matrix of the classical Newton-Raphson method.

In this paper enhancement of the voltage profile for radial unbalanced IEEE 34-node feeder was performed. The power-flow calculations were performed using C++ programing. A practical electricity demand in France daily load curve used to change the loading demand of 34 bus systems during 24 hours. By using SMES system with WEGS at the same bus in distribution system, this can improve the voltage profile of the system in all modes of operation during 24 hours.

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EXAMINING OF REPLACEMENT ACCC CONDUCTORS RATHER THAN ASCR CONDUCTORS IN 20KV OVERHEAD NETWORKS

Shahram Moradi, Ahmad Asghari

Guilan power Distribution Company, Iran
E-mail: moradi_sh@yahoo.com

It seems the overhead lines have the main part of electricity distribution network in Iran, according to the comparative data of the Ministry of Energy. Moreover, ACSR is the usual used conductor in 20kV overhead line. Due to rapid growth of electricity consumption of residential and industrial clients, the system operator needs increase in capacity of power stations and distribution network, which of course requires increasing the conductor cross section. To increase the available conductor cross section, some mechanical recalculations and changes in configuration of current network including different tension in installed towers in angels and end sections and lines equipments are necessary, which installing the new towers in addition to increasing the overall cost of the project it may involve some technical, social, political issues. In this study, the technical and economical comparison of replacing the composite ACCC conductors instead of ASCR without any change in line arrangement and just replacing a conductor with higher capacity is discussed. Therefore, the software which is developed in artificial intelligence MCAL (Mechanical Calculations) is used for the line mechanical calculations.

Composite conductors or ACCC (Aluminum Conductor Composite Core) are made of woven aluminum annealed and trapezoidal strands, which have surrounded the light and strong composite core instead of steel in usual conductors. Composite core of ACCC conductors, are 25 % stronger and 60% lighter to the traditional steel core ACSR conductors. This makes it possible to increase the spun aluminum conductors around the core to 28% more, without changing in conductor overall diameter or its weight. ACCC conductors are designed to be able to work continuously under high temperatures and in overhead line networks. Power (Ohmic) losses in these conductors are far less than traditional conductors, which are used in overhead lines. Due to the high strength to-weight ratio of this conductor, it can be used on long spans. Assume, a typical project with the information of table 1 and the fox ACSR conductor is run and it is in operation. This project is 1260 m long with concrete tower, which the loading factor is equal to 1.5. Regarding the previous mechanical calculations in previous figures, it is found that in case of replacing the fox ACSR conductor with Hayna conductor 126.4 mm2, the required tension power for towers and insulators increases significantly and that means high expenses for removing many towers, as well as line equipment such as consuls, insulators and installing the replacing ones, however if a suitable high capacity composite conductor (can be ordered to the manufacturer) is used (here the equal composite conductor to ACSR fox 42.6 mm^2 which can be ordered) then no change in towers, consuls, and insulators is necessary but in return the capacity of transmission line is multiplied. As in the papers hypothetical model is mentioned and it seen in the following figure, if in some cases in order to increase the capacity of the available transmission line, which is ACSR with small cross-section like ACSR fox 42.6 mm^2 we have to change it to bigger cross-section like ACSR Hayna 126.4 mm^2, then to have significant changes in networks physical characteristics and towers tensions and line equipment there would significant cost increase. However, if ACCC composite conductors equal to available conductor cross section were used, the line physical characteristics would not change. Therefore, as the cost of ACCC conductors is three times more than ACSR conductors, but because the line equipment does not change, so the overall project cost would be less.

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ENERGY EFFICIENT DESIGNS AND TRAINING OF SUSTAINABLE BUILDINGS IN URBAN ENVIRONMENT SO-HYUN PARK AND HYEONGDONG PARK

Essam E. Khalil and Doaa El-Sherif
Professor of Energy, Cairo University, Fellow ASME, Fellow ASHRAE and Fellow AIAA
E-mail: khalile1@asme.org

The Developing communities in their path for rapid development is endeavoring to make all necessary and appropriate measures to enhance the efficiency of energy utilization and increase the beneficiation of the energy resources. The energy production, transmission, distribution and utilization efficiency becomes a vital factor and measure of national development. Governmental organizations were established earlier to be responsible for energy planning and efficient utilization, information dissemination and capacity building as well as devising the necessary codes and standards. Throughout the Nation Energy resources are widely used and consumption rates are in general exceeding the International accepted values. Energy rationalization and audit exercises were developed and monitored by Governmental authorities, Universities and Research centers through the

past two decades with a definitive positive energy reduction and beneficiation. The development of the relevant codes for Residential and Commercial Energy Efficiency in Building is underway through the governmental bodies responsible for the research, training and development in the building Technology sector and is the umbrella under which the National and Unified Arab Codes are developed and issued.

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HOLISTIC APPROACH TO ENERGY PERFORMANCE OF BUILT ENVIRONMENT: DECADES OF ACTIVITIES

Essam E. Khalil[1] and Dick van Dijk[2]

[1]Professor of Energy, Cairo University, faculty of Engineering, Cairo Egypt,

[2]Energy Expert at NEN, Delft, Netherlands

E-mail: khalile1@asme.org

The global energy crisis coupled with the threats of climate change bring into sharp focus both opportunities and challenges for developing countries. Developed and developing countries have to better address the increasing energy demands of growing economies, as well as address energy poverty issues often highlighted by extreme disparities in income. They also need to deal with the real and potential impacts of climate change and energy efficiency improvement. In addition to these challenges is the global imperative to reduce carbon emissions in order to prevent climate change. While developing nations have thus far been sheltered from obligations to reduce carbon emissions, one cannot anticipate that this situation will continue for long. Holistic approach to energy performance in built environment had been a key tool to improve the overall energy performance. Within this context nations need to follow a very different development path from that established by first world countries. This development path is a low energy, low carbon and generally a resource efficient one.

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ANALYSES OF THERMAL COMFORT AND INDOOR AIR QUALITY UNDER STRATUM, DISPLACEMENT AND MIXING VENTILATION SYSTEMS

Ahmed F. Elharoun, Ahmed A. Fahim, Esmail M. Bialy and Essam E. Khalil

Cairo University, faculty of Engineering, Cairo, Egypt

E-mail: khalile1@asme.org

The well-designed ventilation system ensures thermal comfort, indoor air quality and yield energy saving by avoiding excessive high values of Air Changes per Hour (ACH). Stratum ventilation has been a recently proposed air distribution system. The current CFD research investigates the performance of stratum ventilation in an office by using two values of the air change per hour, changing the exhaust location, and changing the supply location. In addition, the numerical model studied the displacement ventilation and mixing ventilation and their results were compared with that of stratum ventilation. The temperature, velocity distribution, CO2 concentration, ventilation effectiveness, effective draft temperature, and air diffusion performance index (ADPI) are discussed for all cases. The model was built and the mesh was generated using gambit 2.3.16 yielding 1.4 million cells. In addition, the model was simulated using Fluent 14. Model validation was done against experimental data using standard k-ε model turbulence model with acceptable agreement to ensure the reliability of the Computational Fluid Dynamic (CFD). From the research, the air change per hour (ACH) has a large effect on the stratum ventilation performance, and it was found that using 5 ACH gives better conditions in terms of thermal comfort and indoor air quality. The supply location is recommended to be above the occupant height to ensure that, the air reaches the breathing zone well. From investigating the stratum, displacement and mixing ventilation, the stratum ventilation provides better velocity, temperature, CO2 concentration, ventilation effectiveness, and air diffusion performance index and ensures thermal comfort and indoor air quality.

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ENHANCEMENT OF POWER SYSTEM TRANSIENT STABILITY USING RESISTIVE SUPERCONDUCTING FAULT CURRENT LIMITER WITH YBCO AND BI-2212

Emad A. Mohamed and Mohamed M. Aly

Aswan Faculty of Engineering, Aswan, Egypt

E-mail: eng.emadabdo@gmail.com

This paper presents the results of analysis about transient stability enhancement using resistive superconducting fault current limiter (RSFCL) with different superconducting materials as YBCO and Bi-

2212. Transient stability investigations concern in studying the rotor oscillation of synchronous generators after the occurrence of large disturbance, e.g. short circuit. The goal is to indicate if the generators remain in synchronism after the short circuit. The fault duration,the output electrical power during the fault and the auto-reclosing of the circuit breaker are the most important factors to be considered. In fact, the shorter the fault and the larger the output electrical power during the fault, the more the maintaining of synchronization can be guaranteed. Superconducting fault current limiter (SFCL) has an extremely fast current limitation and consequently a better ability to maintain the synchronization of the system. The nature of the SFCL helps in increasing the output electrical power during the fault and hence enhances the stability of the generators. Simulation studies are performed using one machine connected to an infinite bus by two parallel lines. The study covers simulations of the RSFCL at different superconducting materials like YBCO and Bi-2212, different fault duration and the auto-reclosing of the circuit breaker.

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A PROPOSED MODEL FOR EXAMINING AND ANALYZING ENVIRONMENTAL COSTS AND THEIR IMPACT ON FINANCIAL STATEMENTS A FIELD STUDY WITH APPLICATION ON PETROLEUM SECTOR IN KUWAIT

Adel Dashti
Kuwait
E-mail: adeldashti1@hotmail.com

The issue of sustainable development has occupied the first rank on top of the world states' agenda for the importance of conserving the environment for next coming generations and the present as well. Concerning in environmental issue is no longer limited on the developed countries but extended to include the underdevelopment states either. The industrial states have become the core of concern of several national and international institutions involved in environmental issues since the industrial process has a direct influence on environmental pollution and depletion of natural resources.

Kuwait state as one of the world states involved in petroleum industry gives great concern to environmental issues as the state is remarkably interested in maintaining the environment as well as its natural resources. In addition, vices are increasing calling for the petroleum sector to take charge of its responsibilities towards the environment. Moreover, Kuwait desires to join the World Trade Organization (WTO), so it has to acts environmental legislations to enforce companies to consider the environment issue. For the previous, the researcher has made a field study to examine and analyze the environmental costs of these industrial companies working in oil field and the costs they should bear environmentally and nature of these costs in attempt to make appropriate decisions and defining environmental statements.

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PdNi CATALYSTS FOR ENERGY CONVERSION IN DIRECT ETHANOL FUEL CELLS (DEFCS)

A.M. Sheikh, M. Soude, A. Atif, C.F. Malfatti
Mechanical Engineering Department, South Valley University, Department of Metallurgy, School of Engineering, UFRGS
E-mail: ahmed.elsheikh@eng.svu.edu.eg

Direct ethanol fuel cells (DEFCs) are currently one pioneering research topic. They could convert the chemical energy of ethanol directly into electricity. Yet, the commercialization of DEFCs is facing many technical challenges. One of them is need for active, selective, and stable catalyst. The catalyst also should not be expensive. In this work, two different PdNi catalysts supported on Vulcan carbon XC-72 functionalized by HNO3 are synthesized using the impregnation-reduction method. Their function is to speed up the reaction kinetics of ethanol oxidation (EOR) in alkaline electrolyte. X-ray diffraction (XRD) was applied to characterize the catalysts surface and the electro-chemical performance was assessed by the techniques of cyclic volatmmetry (CV), and chronoamperometry (CA). The major finding is that the addition of Ni into Pd/C catalysts enhances it is catalytic activity clearly, and yet the catalyst's cost was reduced since the Ni is abundant non-noble metal. The results of Pd/C catalyst prepared by the same method are presented for comparison purposes. The Pd40Ni60/C composition has achieved higher catalytic activity than Pd60Ni40.

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SELF-TUNING DC MOTOR DESIGN BASED ON RADIAL BASIS FUNCTION NEURAL NETWORK

Asmaa Fawzy Rashwan

Faculty of Energy Engineering, Aswan University, Egypt
E-mail: rashwan_asmaa@yahoo.com

This paper introduces the inverse control design using neural network based self tuning regulator (STR) for control the dc motor. The controller is the radial basis function neural network (RBFNN) and acts as inverse of the dc motor. The dc motor parameters are estimated online using the system identification method where uses the Auto-Regressive with eXogenous input (ARX) model which depends on the input and output values of the dc motor. The difference between the output of the dc motor and the reference signal is used to adjust coefficients of ARX model. These coefficients of ARX are used to update the weights of the RBFNN. The weight update equations are derived based on the least mean squares principle. The speed output tracks the reference trajectory though the self tuning regulator (STR) structure exposed to different types of disturbances for wide range of operating conditions.

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IMPLICATION OF THERMAL ENERGY DISTRIBUTION TOWARDS HUMAN COMFORT IN A SPACE: A FIELD ANALYSIS

Ahmad Rasdan Ismail, Norfadzilah Jusoh, Rosli Abu Bakar, Nor Kamilah Makhtar and Suriatini Ismail
University Malaysia Kelantan, Malaysia
E-mail: rasdan@umk.edu.my

Malaysia is one of the countries located at hot and humid tropical region. The average mean temperature in a day ranges from 31.6 C during the daytime to 24.6 C, during the night. Also the humidity is uniformly high all through the year. In such a climate, all the building in Malaysia depend more to the air-conditioning and mechanical ventilation (ACMV) systems to make sure all the building occupant feel comfort in that particle building. Air conditioning is essential for maintaining environment thermal comfort in indoor the building, especially for climates such as Malaysia.

The aim of this study was to investigate the implication of thermal distribution to human in the office building. The physiological factors have been choosing as a main parameter which is heart rate. In recent years, a lot of study investigated into the thermal comfort using physiological mechanisms such as vasodilation, vasoconstriction, sweating, and metabolic heat production. Before this, the predictive mean vote (PMV) model develop by Fanger is popularly used to predict the thermal perceptions of a buildings occupants. An estimated thermal sensation has been used to generate an optimal thermal sensation that would enhance human comfort and minimize energy use by preventing over-heating and excessive cooling. It is proving that the mechanisms of thermal comfort could be understood only by using the knowledge of physiology. To investigate of the thermal sensation of people located in no-uniform environment, it is very important to define the local heat transfer detail. In this paper, will be discuss details about the material and experiment test that used to conduct the study. Its include field of study, locations selected for study, subjects of the study, procedure of study and method of data collection.In this context, the purpose was to make thermal comfort comparison between temperature settings of air conditioning. The temperature was maintained at five different levels which are 19, 21, 23, 26 and 29 oC. The study was carried out in environmental chamber at Universiti Malaysia Pahang. According to experimental, found that temperature ranges between 21-29oC and relative humidity 50%-60% give difference temperature that indicates the level of comfort by subjects. The most comfort zone for office room air temperature is 23oC. At this temperature the heart rate level shows by subject are at medium level, so that subjects are comfort to do their office task and may lead to increasing performance and productivity. Lower relative humidity accelerates evaporation of moisture, thus lead to human body to feel overcooling. Therefore, when the air temperature is lower or higher the performance of subjects will decrease and dropped base on heart rate reading of ECG and thermal comfort assessment of PPD and PMV.

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STABILIZATION OF A WIND FARM USING STATIC VAR COMPENSATORS (SVC) BASED FUZZY LOGIC CONTROLLER

M.G. Hemeida, H.R. Hussien, M.A. Abdel Wahab and M.M. Hamada
Electrical Engineering Department, Faculty of Engineering, Minia University, Egypt
E-mail: mahmod_hmeda2000@yahoo.com

Wind energy is a cost competitive, environmentally clean and safe renewable energy sources. Wind farm capacity connected to power system increasing rapidly world wide. During transient conditions wind farm drive a large reactive power which in turn causes voltage instability. Power quality and system stability issues received a great concern from

researchers. In this article, Static VAR Compensator (SVC) based fuzzy logic controllers has been used as a supplementary controller to improve transient stability and power oscillation damping of a wind farm connected to power system. Different fault types and different fault durations were considered for the study to investigate the effect of the (SVC) based fuzzy logic controller (FLC) on system stability. The suggested fault types are, single line fault, double line fault, and three line to ground faults. The different duration faults are 50ms, 80ms and 100ms. Different locations are considered for the SVC at the studied system. The proposed SVC based FLC controller provide the wind farm system with damping effect during transient condition and provides much smoother and quicker response after fault clearance. The proportional plus integral (PI) conventional controller is used for the comparative study. The studied system consists of wind farm represented by double fed induction generator (DFIG) connected to grid. The Matlab/Simulink is used to simulate the studied system.

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RENEWABLE ENERGY IN EGYPT

Dina Taman

Euro-Mediterranean Studies Program, Faculty of Economics and Political Sciences, Cairo University, Egypt

E-mail:dfadl@yahoo.com

In light of the changes that take place in the Arab region generally, and in Egypt in particular, it is become a must to find new sources of energy to construct the new nations in responding to millions of peoples will. It is well known that the renewable energy is able to change the level of life of people in poor nations and developing countries. While these countries suffer from the poor level of fuels and electricity, they are rich in natural resources such as, sunlight, rain, wind, and waves, which are considered the main factors of renewable energy in the world. In this paper we will discuss the renewable energy in Egypt by studying:

First, the types and challenges of renewable energy sources in Egypt. Second, the impacts of renewable energy on different fields in rural areas in Egypt including: agricultural, environmental, political, social, and economic fields. Third, the future of renewable energy in Egypt in light of some international experiences in different countries in the world.

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WIND PENETRATION IN ELECTRICITY NETWORK VOLTAGE STABILITY BASED ON SVC DEVICES

Ashraf M. Hemeida[1] and Ayat A. Saleh[2]

[1]Ar-Rass Faculty of Science and Arts, Qassim University, Saudi Arabia

[2]High voltage network department, Faculty of energy Engineering, Aswan University, , Egypt

E-mail: eng_ayat87@yahoo.com

This paper investigates the effectiveness of Flexible AC Transmission System (FACTS) controllers and wind generators on voltage stability of a power system network. The wind generators considered as variable speed doubly-fed induction generator (DFIG).

(FACTS), such as the Static Var Compensator (SVC) devices are Able to resolve voltage regulation and voltage stability problems Of the system under steady state and transient stability.

Transient stability under three phase fault (occurred at different location in the network.) is investigated via simulation using MATLAB/SIMULINK software. Study shows when (SVC) applied in power transmission systems can be solve the problems of poor dynamic performance and voltage regulation in 14 bus transmission system so increases damping

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SOLAR ENERGY AND THE DRAMA OF LIFE ON EARTH, FROM THE BIG BANG TO GAIA

Sobhy R. Atalla

Department of Physics, Faculty of Science, Fayoum University, Egypt

Since the solar system was formed, the sun is the sole energy supplier to Earth. Solar energy provides light for photosynthesis for plants to grow, heat to control weather and ultraviolet radiation to help destroy harmful micro-organisms.

With the depletion of the earth resources of energy: coal, oil …, an intensive effort is done to utilize the solar energy to substitute the conventional energy sources to keep life on Earth. The main effort is focused on production of electricity and solar heating.

Analysis of this drama of life on Earth shows the close relationship between matter, energy, entropy and life itself. Gaia shows an excellent

example of mutual interdependence of living and non-living matter, as major actors of this drama.

Along with this delicate balance of sun-earth energy flow, there are serious threats that may disturb this balance. These threats include depletion of hydrogen in the sun, collapse of the solar system, or collision of some cosmological body with Earth.

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EXPERIMENTAL AND CFD OF DESIGNED SMALL WIND TURBINE

Walid Mohammed

Faculty of Energy Engineering, Aswan University, Egypt

E-mail: Welaa2005@msn.com

Many researches have concentrated on improving the aerodynamic performance of wind turbine blade through testing and theoretical studies. A small wind turbine blade is designed, fabricated and tested. The power performance of small horizontal axis wind turbines is simulated in details using Computational Fluid Dynamic (CFD). The three-dimensional CFD models are presented using ANSYS-CFX v13 software for predicting the performance of a small horizontal axis wind turbine. The simulation results are compared with the experimental data measured from a small wind turbine model, which designed according to a vehicle-based test system. The analysis of wake effect and aerodynamic of the blade can be carried out when the rotational effect was simulated. Finally, comparison between experimental, numerical and analytical performance has been done. The comparison is fairly good.

57-

STUDY OF THE EFFECT OF POROUS MEDIUM (SAND) THICKNESS ON DOUBLE SLOPE SOLAR STILL PRODUCTIVITY WITH CONSIDERING HUMID AIR REGION

Sherif Adham Mohamed

Assistant Lecturer (PhD Candidate), Egypt

E-mail: sherifadham2ooo@yahoo.com

This current work studies the effects of initially saturated porous medium and humid air region on the water vapor condensation. The experiments of the present study were conducted on a double slope solar still (DSSS). The DSSS liner dimension is 1.9 m by 0.86 m by (0.02 m, 0.03 m and 0.04 m). The effect of porous medium thickness on the productivity of distillate was considered as well. The DSSS is used for desalination of salt water at different climatic conditions (winter and summer seasons). The results showed that the humid air temperature was higher than the porous medium temperature all time of day light and seasons whenever the water vapor absorbs the infrared radiation in bands region of 1.38 and 1.8 . There is an energy storage in the humid air region whenever energy storage increases, the humid air temperature increases. The results showed that the high porous medium thickness did not enhance the amount of water diffusion but the solar flux is significantly affected the amount of distillate water. The absorption coefficient of porous medium components for solar flux is expected from the temperature distribution measurements.

58-

SOLAR POWERED SWITCHING DC POWER SUPPLY

Mohamed Ahmed Azab

Renewable Energy Center, Royal Commission at Yanbu, KSA

E-mail: azabm@rcyci.edu.sa

The objective of this paper is to study and investigate a PV powered switching dc power supply based on SEPIC converter which can be employed in several applications in arid regions such as water pumping systems and battery charging systems in arid regions found in Middle East. The output voltage of the solar powered SEPIC converter is well controlled to the desired value using two feedback control loops; an outer voltage control loop is employed to regulate the load voltage, and an inner current control loop to limit the switch current to a safe value. The parameters of both voltage and current PID controllers are off-line determined by particle swarm technique. The performance of the switching converter is studied under different operating conditions including input voltage variation, load variation and also for step change in the reference load voltage. Both simulation and experimental results proved the effectiveness of the investigated system to control and regulate the load voltage to the desired value.

59-

THEORETICAL STUDY OF THE EFFECT OF THE ANGLE OF INCIDENCE ON THE OPTICAL PERFORMANCES OF TWO INTEGRATED SOLAR COLLECTORS

Olfa Helal, and Bechir Chaouachi

Research Unit: Environment, Catalyzes and Process Analysis, National School of Engineers of Gabes Omar Ibn Khettab Street, 6029 Gabes, Tunisia

E-mail: helal_olfa@yahoo.fr

With the aim to improve the optical performances of an existing integrated collector storage (ICS) solar water heater composed of a single cylindrical horizontal tank placed in a reflector composed of three parabolic sections, a new system of integrated solar collector was designed and a theoretical study based on the effect of the angle of incidence on the optical performances was done for comparison. The new model consists of two concentrating stages. Its upper part contains two symmetrical parabolic sections with focal axess tilted by 48 from the vertical plane. Its lower part is constituted by three involute reflectors and its cylindrical storage tank covers the triangle formed by the three involute parts centers. A mathematical code written on matlab was developed to simulate the effect of the angle of incidence on the optical performances such as the mean average number of reflections, the optical efficiency and the total absorbed energy. The obtained results, when compared with the old experimented model differing on the design of the lower stage concentrator, showed a significant improvement.

60-

IMPROVEMENT OF POWER QUALITY USING MULTIPLE TYPES OF FACTS DEVICES

Mai Moddather, Abdel-Moamen M.A., and Gaber Shabib

Faculty of Energy Engineering, Aswan University, Aswan, Egypt

E-mail: abdelmoamen@gmail.com

Modern power systems are continuously being expanded and upgraded to cover the need of ever growing power demand during the design of modern power systems one has to consider the growth in the use of power electronics that has caused a greater awareness of power quality. Voltage sags , swells, harmonics etc. are the various power quality problems that can cause equipment to fail, or shut down, blown up fuses or tripping of breakers due to large current imbalances. Flexible AC Transmission System (FACTS) devices have been investigated and adopted in power engineering area. There are so many advantages in using FACTS devices. It can increase dynamic stability, loading capability of transmission lines, improve power quality as well as system security. It can also increase utilization of lowest cost generation.

This paper explains the problems that are due to poor power quality in electrical systems and shows their possible improvement by using multiple types of FACTS devices namely Static Synchronous Compensator (STATCOM), Static Synchronous Series Compensator (SSSC), Unified Power Flow Controller (UPFC) This paper focuses on the operation of the FACTS device under generator fault that may cause any other transmission lines to be overflowed. The performance of the proposed model has been tested for power grid consists of two 500-kV equivalents (respectively 3000 MVA and 2500 MVA) connected by a 600-km transmission line. It has also been observed that the proposed model can be applied to larger systems and do not suffer with computational and mathematical difficulties.

61-

ROBUST TECHNIQUE LFC OF TWO-AREA POWER SYSTEM WITH DYNAMIC PERFORMANCE OF COMBINED SMES AND SSSC CONTROL

A.M. El-Noby, Gaber El-Saady, Youssef Mobarak, Abdel-Moamen M. A., Mohamed A.A. Wahab, and Mohamed M. Hamada

Faculty of Energy Engineering, Aswan University, Egypt

E-mail: ahmednoby100@yahoo.com

Superconducting Magnetic Energy Storage (SMES) unit with a self-commutated converter is capable of controlling both active and reactive power simultaneously and quickly, increasing attention has been focused recently on power system stabilization by SMES control. This paper presented a new technique robust control design for load-frequency control (LFC) in two-area power systems with Static Synchronous Series Compensator (SSSC). The LFC problem is considered as a multi-objective problem and formulated via a SMES new control technique. The proposed selftuning control scheme is used to implement the Automatic Generation Control (AGC) for LFC application adding to SMES control configuration. A two-area power system studied with a wide range of load changes is given to illustrate the proposed approach. The results are compared with the

configuration of modified technique SMES units combined with SSSC technique. It is shown that the designed controllers maintain the robust performance, minimize the effect of disturbances and specified uncertainties very effectively. It has also been observed that the designed controllers can be applied to multi-area systems and do not suffer with computational and mathematical difficulties.

62-

STABILITY IMPROVEMENT OF POWER SYSTEM BY USING PSS WITH PID AVR CONTROLLER IN ASWAN HIGH DAM

Elhussein Ahmed, Abdel-Moamen M.A. and Gaber Shabib

Faculty of Energy Engineering, Aswan University, Aswan, 81528 Egypt
E-mail: elhusseinahmed25@yahoo.com

The main objective of an automatic voltage regulator (AVR) is the accurate control and regulation of the terminal voltage and the reactive power flow of a synchronous machine. In order to fulfill these requirements, the field voltage must react quickly to changes of the operating conditions, i.e. with a response time that does not exceed a few milliseconds. To accomplish this, a high-speed controller is required. It continuously compares the actual values with the set point values and changes the final control element (firing angle for the converter) with an insignificant delay. The main control device calculates the controlled variable from the measured values in very short time intervals. The result is a quasi-continuous behavior with a negligible time delay. In recent years, the scale of power systems has been expanding, and with that expansion smooth power operation is becoming increasingly important. One of the solutions is to realize a practical high speed, highly reliable exciter system that is suitable for stable operation of a power system. In this work, a model of a static excitation system of an alternator connected to a network via a transformer has been built using MATLAB-SIMULINK. The parameters of the machine have been obtained from the Aswan High Dam power station taking into account saturation effects. A PID controller is used to control the output voltage of the synchronous generator for static excitation systems. A method based on step response has been proposed and verified for tuning the parameters of the controller. In order to validate the simulated results of the system with AVR, the results have been compared with practical results of the Aswan High Dam and a good agreement has been realized. However, in large generating units, undesirable oscillations in the active power and speed result as a side effect of the AVR control or due to outside disturbances.

63-

OPTIMAL OPERATION OF STANDALONE PV PUMPING SYSTEM BASED ON AN INDUCTION MOTOR

Adel A. Elbaset[1], Ali H. Kasem Alaboudy[2] and Saad A. Mohamed Abdelwahab[2]

[1]Faculty of Engineering, Minia University, Egypt.
[1]Faculty of Postgraduate Studies for Advanced Science, Beni-Suef University.
[2]Faculty of Industrial Education, Suez University, Suez, Egypt.

In this paper, a PV array is used for water pumping purposes at remote or abandoned locations. Egypt is a developing country and largely depends on cultivation that won't be possible without water availability. This paper presents the performances of a PV pumping system based on an induction motor under variable solar irradiations and ambient temperatures. The Maximum Power Point Tracker (MPPT) based on perturb and observe (P&O) algorithm for the purpose of improving efficiency of the system is connected to the system. The main objective of this work is water pumping system, employing an induction motor pump, capable of supplying a daily average of 55 m^3/ h_r at 20-m head has been developed. The system was installed on at western desert area in Egypt. The results presents a MATLAB/SIMULINK based modeling and simulation scheme suitable for studying the PV array under variable solar irradiations and ambient temperatures. The proposed model is very useful for PV engineers and experts who require a simple, fast and accurate PV simulator to design their systems.

Keywords: *Stand-alone PV systems, Maximum Power Point Tracking (MPPT), Perturb and Observe (P&O), Boost DC/DC converter, DC/AC inverter, water pumping.*

64-

PREPARATION, STABILITY AND PHOTOCATALYTIC ACTIVITY OF TITANIA NANOFLUID USING GAMMA IRRADIATED TITANIA NANOPARTICLES BY TWO-STEPS METHOD

Radwa A. Elsalamony, Rania E. Morsi, Ahmed M. Alsabagh
Egyptian Petroleum Research Institute
E-mail: radwa2005@hotmail.com

The aim of this research is to investigate the stability of titania nanofluid by utilizing the effect of gamma irradiation during the preparation of nano titania. Nanofluids with 0.0075-0.1 wt % loading of TiO2 nanoparticles were prepared using a two-step method. Ultrasonic processing was applied to help the homogeneity and Sodium Dodecyl Sulfate (SDS) as anionic surfactant was added to increase - the stability of the samples. UVvis spectrometry, particle size distribution, zeta potential, Transmission Electron Microscopy (TEM) and sedimentation photo capturing were applied to visualize the stability and sedimentation rate of the prepared nanofluids. The results revealed that nanofluid prepared using TiO2 irradiated with gamma radiation during preparation are the most stable suspension within 37 days. In addition, photocatalytic activity of nanofluids was examined using Methylene Blue dye (MB) as hazardous compound. It was found that for the same amount of TiO2 sample used, the prepared nanofluid TiO2 showed higher efficiency for this reaction.

65-

INTELLIGENT ADAPTIVE CONTROL OF A ONE LINK MANIPULATOR SYSTEM USING SELF TUNING REGULATOR

Asmaa Fawzy
Energy Engineering Faculty, Aswan University, Egypt
E-mail: rashwan_asmaa@yahoo.com

This paper introduces the inverse control design using neural network based self tuning regulator (STR) for control the one link manipulator system. The controller is the radial basis function neural network (RBFNN) and acts as inverse of the one link manipulator system. The one link manipulator system parameters are estimated online using the system identification method where uses the Auto-regressive moving average (ARX) model which depends on the input and output values of the one link manipulator. The difference between the output of the one link manipulator and the reference signal is used to adjust coefficients of ARX model. These coefficients of ARX are used to update the weights of the RBFNN. The weight update equations are derived based on the least mean squares principle. The position output tracks the reference trajectory though the self tuning regulator (STR) structure exposed to different types of disturbances for wide range of operating conditions.

We used the proportional-plus-integral feedback (PI) as a controller instead of the RBFNN and compare results.

66-

OPTIMUM INJECTION DOSE RATE OF HYDROGEN SULFIDE SCAVENGER TO TREATMENT PETROLEUM CRUDE OIL

T.M. Elshkeikh, H.A. Elmawgoud, S.A. Khalil, and **A.M. Alsabagh**
Egyptian Petroleum Research Institute
Email: taherelshiekh@yahoo.com

Hydrogen sulfide H2S scavengers are chemicals that favorably react with Hydrogen sulfide gas to eliminate it and produce environmental friendly products. These products depend on the type and composition of the scavenger and the conditions at which the reaction takes place. The scavenger should be widely available and economical for industry acceptance by having a low unit cost. The optimum values of H2S scavenger injection dose rate of the scavenging process of hydrogen sulfide from the multiphase fluid produced at different conditions wells field data from existing oil wells in one of the Petroleum Company in Egypt was studied. The optimum values of H2S scavenger injection dose rate depend on pipe diameter, pipe length, gas molar mass velocity, inlet H2S concentration and pressure. The optimization results are obtained for different values of these parameters using the software program Lingo. In general the optimum values of H2S scavenger injection dose rate of the scavenging process of hydrogen sulfide is increased by increasing of the pipe diameter and increasing the inlet H2S concentration, and it decreased by increasing the pipe length, gas molar mass velocity and pressure.

Keywords: *Optimization, Hydrogen sulfide removal, H2S scavengers, injection dose rate*

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ESTIMATION OF ECONOMIC THICKNESS OF THERMAL INSULATION FOR PROCESS PIPING AND EQUIPMENT

T.M. Elshiekh, and H.A. Elmawgoud
Egyptian Petroleum Research Institute
E-mail: taherelshiekh@yahoo.com

One of the primary purposes of insulation is to conserve energy and increase plant profitability by reducing operating expenses. The thermal insulation thickness that satisfies an economic assessment of the minimal cost of owning and operating a thermal system is called the economic thickness. In this work, an attempt has been made to formulate a predictive correlation that is easier to apply than existing approaches, less complicated with fewer computations, and suitable for refinery process engineers, for the rapid estimation of the economic thickness of thermal insulation suitable for process piping and equipment. The correlation is as a function of steel pipe diameter and thermal conductivity of insulation for surface temperatures at 100 ^{o}C, 200 ^{o}C, 300 ^{o}C, 400 ^{o}C, 500 ^{o}C, 600 ^{o}C and 700 ^{o}C , and pipeline diameter up to 0.5 m. The average absolute deviation percent of proposed correlation is within the acceptable values. The results showed the excellent performance of proposed simple correlation for estimating the economic thickness of the thermal insulator.

68-

MODELING AND OPTIMIZATION OF FUEL RICH AND FUEL LEAN CATALYTIC COMBUSTION OF STABILIZED CONFINED TURBULENT GASEOUS DIFFUSION FLAMES OVER NOBLE DISC BURNERS

Tahani S. Gendy, Taher M. ElShiekh, Amal S. Zakhary, Salwa A. Ghoneim, and Ahmed K. Aboul-Gheit
Egyptian Petroleum Research Institute
Corresponding author's E-mail: taherelshiekh@yahoo.com

A mathematical model has been developed for the experimentally studied catalytic combustion of stabilized confined turbulent gaseous diffusion flames. The $Pt/\gamma Al_2O_3$ and $Pd/\gamma Al_2O_3$ disc burners were situated in the combustion domain and the experiments were performed under both fuel-rich and fuel-lean conditions. The fuel-rich and fuel-lean conditions were considered at a modified equivalence (fuel/air) ratio (Ø) of 0.75 and 0.25 respectively. The thermal structure of these catalytic flames developed over the Pt and Pd disc burners were examined via measuring the mean temperature profiles in the radial direction at different discrete axial locations along the flames. Several polynomial mathematical models of fourth degree have been suggested and investigated to study this phenomenon to find the best correlation representing the experimental data. The *Ln (response)* polynomial equation revealed to be the most adequate one to represent the data. Least Squares regression analysis has been employed to estimate the coefficients of the polynomial and investigate its adequacy. For most of the investigated cases at the various discrete locations of axial distances along the flame over the catalytic disc burners, *x (mm)*, high values for $R^2 > 0.9$ obtained prove the adequacy of the suggested polynomial for representing the experimental results. Very small values of significance $F < (\alpha = 0.05)$ for all investigated cases indicate that there is a real relationship between the independent variable r and the dependant variable T. The low values of $p < (\alpha = 0.05)$ obtained for the recorded parameters disclose that they are significant for the investigated cases.

Keywords: *Modeling and optimization; thermal structure; Fuel-rich; Fuel-lean; Noble catalytic disc burners.*

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ENERGY EFFICIENCY OPPORTUNITIES IN WATER TREATMENT (WT) AND WASTE WATER TREATMENT (WWT) PLANTS IN EGYPT

A.A. Khozam
Energy Consultant, Cairo, Egypt

Abstract not available.

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ICEST 2015 Notes
16-19 Feb. 2015
Cairo, Egypt

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ICEST 2015
Conference Timetable

Time	Mon., 16 Feb.	Tue., 17 Feb	Wed., 18 Feb	Thu., 19 Feb
9:00-10:30	**Reg./ OS**	**RET1**	Full	**IET2**
10:30-11:00	Tea/Coffee	Tea/Coffee	Day	Tea/Coffee
11:00-13:00	**KNR1**	**KNR2**	Giza/Cairo	**RET2**
13:00-14:00	Break	Break	(Pyramids/	**SMC2**
14:00-15:30	**ETD / IET1**	**EME / SMC1**	Egyptian	Conf. Lunch
15:30-17:00	**GBE / NET**	**Poster Session**	Museum)	**CS**
19:00-22:00	Fatimide Cairo	Cruise on the Nile	Free Evening	

Programme abbreviations:

OS	Opening Session	**IET**	Innovations in Energy Technology
KNR	Keynote & Review Talk	**NET**	New & Emerging Technologies
EME	Energy Management & Economics	**RET**	Renewable Energy Technologies
ETD	Energy Transmission & Distribution	**SMC**	System Modeling & Computation
GBE	Green Buildings & Environment	**CS**	Closing Session

المؤتمر الدولى الثالث لنظم وتكنولوجيات الطاقة

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19-16 فبراير 2015
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