## CONFERENCE PROGRAM March 24-26, 2018, Shanghai, China

### 2018 Asia Power and Energy Engineering Conference

### (APEEC 2018)



### Organized by:



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## Welcome Address

We are pleased to welcome you to 2018 Asia Power and Energy Engineering Conference, which will take place in Shanghai, China, from the 24th to the 26th of March in 2018.

After several rounds of review procedure, the program committee accepted those papers to be published in conference proceedings. We wish to express our sincere appreciation to all the individulas who have contributed to APEEC 2018 conference in various ways. Special thanks are extended to our colleagues in the program committees for their thorough review of all the submissions, which is vital to the success of the conference, and also to the members in the organizing committee and the volunteers who had delicated their time and efforts in planning, promoting, organizing and helping the conference.

This conference program is highlighted by Two Keynote Speakers: Prof. Dennis Leung, The University of Hong Kong, Hong Kong; Prof. Hossam Gaber, UOIT, CANADA, and one Plenary Speaker: Assoc. Prof. Frank Gunzer, German University in Cairo, Egypt.

One best presentation will be selected from each session, evaluated from: originality; applicability; technical Merit; qualities of PPT; English. The best one will be announced and awarded the certificate at the end of each Session.

It is also a great opportunity to explore Shanghai, the east city of ancient China, are world—famous for its fast economic development. With traditional architecture, such as Yu garden and modern sight on fashion, shanghai is becoming more and more appealing. Due to its unique style, history and location, shanghai turns into an international city as a bridge between foreign countries and China.

We wish you a successful conference and enjoyable visit in Shanghai!

Prof. Hossam Gaber, UOIT, CANADA Conference Chair

## Organizing Committees

### **Conference Chair**

Prof. Hossam Gaber, UOIT, Canada

### **Program Chairs**

Prof. Ken Mao, Warwick University, UK Prof. Frank Gunzer, German University in Cairo, Egypt

### Local Chair

Prof. Zhixin Wang, Shanghai Jiao Tong University, China

### **Technical Committees**

Prof. Takemi Chikahisa, Hokkaido University, Japan **Prof. Diego Bellan**, Polytechnic University of Milan, Italy **Prof. Xianyong Xu, Hunan Electric Power Company Changsha, China** Prof. Rachnarin Nitisoravut, Sirindhorn International Institute of Technology, Thailand Prof. Alireza Ghasempour, University of Applied Science and Technology, Iran Prof. Poorani Shivkumar, Karpagam University, India Prof. Kamel Eddine HEMSAS, University Ferhat Abbas Setif-1, Algeria Prof. Juhana Jaafar, Universiti Teknologi Malaysia, Malaysia **Prof. Avijit Ghosh,** Heritage Institute of Technology, India Prof. Murat Celik, Abdullah Gul University, Turkey Prof. Mehdi Bagheri, Nazarbayev University, Kazakhstan Prof. Thanakom Soontornchainacksaeng, King Mongkut's University of Technology North Bangkok, Thailand Prof. G. Kumaresan, Anna University, India Prof. Yuli Indartono, Institut Teknologi Bandung, Indonesia Prof. P. Ganeshkumar, PSNA College of Engineering and Technology, India Prof. Aissa Kheldoun, University of Boumerdes Algeria, Algeria Prof. Adisak Pattiya, Mahasarakham Univeristy, Thailand Prof. Rosemizi Abd Rahim, UMIMAP, Malaysia

Local Information

**Conference Venue** 

Conference will be held at *Ramada Plaza Peace Hotel Shanghai (上海华美达广场和平大酒店)*. Address: No.688 Xietu Road, Huangpu, 200023 Shanghai, China (黄浦区 斜土路 688 号)

Time UTC/GMT+8

Currency RMB(¥)



#### **General emergencies**

The Public Security Bureau (i.e. Police) in Shanghai maintains a hotline for foreigners if they run into trouble. The person who answers the phone supposedly understands and speaks English. The number is 021 63576666.

Shanghai police offers English service as well. Dial 110 and once you hear the operator say "English please" and wait until they put an English speaking officer into the line who will then translate for the Chinese operator. Shanghai police is generally very helpful towards foreigners and you should absolutely not hesitate to call them when really needed.

Most western consulates have after-hour emergency numbers (which is usually a mobile phone the duty officer takes home for the night). Check the website of your consulate for that number before you go.

#### **Medical emergencies**

Be aware that if you encounter a medical emergency, ambulance service is slow and unreliable, and they often demand payment in cash (about RMB 199) up front before they will transport you. Also ambulances are by no means comparable to what Westeners are used to when it comes to equipment and medical education of the staff. It's better to take a taxi to the emergency room.

The United States consulate provides a list of medical facilities with English speaking staff. Note that all of them also have Western prices which need to be paid after the consultation - so take your credit card with you.



### The Weather Situation of Shanghai during Conference days





How to find the conference venue? Just some suggestions. Please google it. That could be more correct.

### Shanghai Pudong International Airport - Ramada Plaza Peace Hotel Shanghai

1. Recommend route I



### 2. Recommend route I I

10:49 AM o	Pudong International Airport
10:59 AM	Pudong International Airport
	Subway Line 2 East Extension Line Guanglan Road 43 min (8 stops) Service run by .
11:42 AM 11:45 AM	Guanglan Road
	Subway Line 2 Xujing East 20 min (6 stops) Service run by .
12:05 PM 12:13 PM	Century Avenue
	Subway Line 9 Songjiang South Railway Station 13 min (5 stops) Service run by .
12:26 PM 0	Dapuqiao ★ Walk About 9 min , 700 m ▲ Use caution - may involve errors or sections not suited for walking Take exit Entrance & Exit 2
	↑ Head southeast on 打浦路 toward 徐家汇路
	┓ Turn left onto 斜土路
	▶ Turn right to stay on 斜土路
	<ul> <li>Turn left to stay on 斜土路</li> <li>● Destination will be on the right</li> </ul>
12:35 PM 💿	Ramada Plaza Peace Shanghai DaPuQiao, Huangpu Qu, China

### Shanghai Hongqiao International Airport - Ramada Plaza Peace Hotel Shanghai

1. Recommend route I



2. Recommend route I I

11:16 AM 🕴 Hongqiao Airport Terminal 1 Subway Line 10 Xinjiangwancheng 25 min (10 stops) Service run by 11:41 AM 🝳 Xintiandi ∦ Walk About 3 min A Use caution - may involve errors or sections not suited for walking Take exit Exit 1 ↑ Head northeast on 复兴中路 toward 黄陂南路 ↑ Turn left onto 黄陂南路 11:54 AM 🍦 黄陂南路复兴中路 ■ 932路 天钥桥南路龙兰路 16 min (4 stops) Service run by 12:10 PM 🜻 斜土路打浦路 ⊀ Walk About 1 min, 94 m A Use caution - may involve errors or sections not suited for walking 1 Head west on 斜土路 ♥ Turn left to stay on 斜土路 ┏ Turn right to stay on 斜土路 Destination will be on the left 12:11 PM 💩 Ramada Plaza Peace Shanghai DaPuQiao, Huangpu Qu, China

# Instructions for Oral & Poster Presentations

#### Oral presentations

Oral presentations for APEEC have been allocated 20 minutes of effective presentation time, including Q/A time between Session Chairs and speakers.

Authors must prepare their oral presentations to be sure to convey their message in clear and sharp manner, including giving outline of the key principles, facts and results. More detailed discussions can continue during the breaks.

In order to ensure a smooth performance during your session, we kindly ask you to consider the following instructions:

Be at the session room 15 minutes before session starts and introduce yourself to the session chairs.

A video projector and a PC will be available in all conference rooms. Speakers suggested not use their own laptop computer, avoiding useless time breaks in between presentations.

Bring your presentation on a USB memory stick in MS-PowerPoint or Adobe PDF formats, and upload it in the Session Room computer no later than 10 minutes prior to your session start! You can also bring it earlier, during the coffee/lunch breaks before your presentation. Please upload your presentation in a right place in order to find it easily at the time of presentation.

Please wear formal clothes or national characteristics of clothing for participation.

In order to avoid any compatibility problems, read carefully the instructions below.

#### **Power Point Instructions**

For MS-PowerPoint presentations, please use the following versions only: PP 97-2003 (\*.ppt) or 2007, 2010 to guarantee that it will be opened successfully on the on-site PC

We recommend to the PPT/PPTX format instead of PPS

All videos or animations in the presentation must run automatically!

#### **Pictures/Videos**

We cannot provide support for embedded videos in your presentation; please test your presentation with the on-site PC several hours before your presentation.

In case your video is not inserted in MS-PowerPoint, it is possible to have it in other formats – MPEG 2,4, AVI (codecs: DivX, XviD, h264) or WMV. Suggested bitrate for all mpeg4 based codecs is about 1 Mbps with SD PAL resolution (1024x576pix with square pixels, AR: 16/9).

#### Fonts

Only fonts that are included in the basic installation of MS-Windows will be available (English version of Windows). Use of other fonts not included in Windows can cause wrong layout/style of your presentation.

Suggested fonts: Arial, Times New Roman.

If you insist on using different fonts, these must be embedded into your presentation by choosing the right option when saving your presentation:

Click on "File", then "Save As"

Check the "Tools" menu and select "Embed True Type Fonts"

#### **Poster presentations**

Suggested Poster with size of 60cm\*80cm(width\*height).

Posters are required to be condensed and attractive. The characters should be large enough so that they are visible from 1 meter apart.

During poster session, the author should stand by your poster, explaining and answering doubts or questions.

## Program at a Glance

### **March 24 Registration**

10:00-16:00	Note: *Collecting conference materials				
	*Certificate of oral presentations will be signed and issued after each session.				
	*Certificate of poster presentations and listeners will be got when collect conference materials				
	at Registration Desk, please ask chair to sign it for you.				
	*Accommodation not provided, and it's suggested to make an early reservation.				
	*Take care of all your belongings during the conference days.				

### **March 25 Presentation Day**

	VIP Meeting Room 1 (5 <sup>th</sup> Floor)				
9:00-9:05	Opening Remark- Prof. Hossam Gaber, University of Ontario Institute of Technology, Canada				
9:05-9:55	Keynote Speech I - Prof. Dennis Leung, The University of Hong Kong, Hong Kong				
9:55-10:45	Keynote Speech - Prof. Hossam Gaber, University of Ontario Institute of Technology, Canada				
10:45-11:15	Group photo&Coffee Break				
11:15-12:00	Plenary Speech I - Prof. Frank Gunzer, German University in Cairo, Egypt				
12:00-13:30	Lunch (3 <sup>rd</sup> Floor)				
	VIP Meeting Room 1 (5 <sup>th</sup> Floor)				
13:30-15:50	Technical Session (Oral)				
15:50-16:10	Coffee Break				
16:10-17:00	Technical Session (Poster)				
17:00-19:00	Dinner & Banquet(3 <sup>rd</sup> Floor)				

### March 26 One day tour

9:00-17:00 Optional One Day Tour
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\*The Group Photo will be updated online.

\*\*One best presentation will be selected from each session; the best one will be announced at the end of each session and awarded a winner certificate. The winners' photos will be updated online.

\*\*\*Best Presentation will be evaluated from: Originality; Applicability; Technical Merit; PPT; English. \*\*\*\*Please arrive at the conference room 10 minutes earlier before the session starts, copy your PPT to the laptop.

## **Keynote Speeches I**



### Prof. Hossam Gaber University of Ontario Institute of Technology (UOIT), Canada

**Biography:** Dr. Gabbar is a full Professor in the University of Ontario Institute of Technology (UOIT) in the Faculty of Energy Systems and Nuclear Science, and cross appointed in the Faculty of Engineering and Applied Science, where he has established both the Energy Safety and Control Lab (ESCL) and Advanced Plasma Engineering Lab. He is the recipient of the Senior Research Excellence Aware for 2016, UOIT. He is leading national and international research in the areas of smart energy grids, safety and control systems, advanced plasma systems and their applications on nuclear, clean energy and production systems. He is leading research in Canada with international recognition in energy safety and control for nuclear and energy production facilities. Dr. Gabbar obtained his B.Sc. degree in 1988 with first class of honor from the Faculty of Engineering, Alexandria University (Egypt). In 2001, he obtained his Ph.D. degree from Okayama University (Japan) in the area of Safety Engineering. From 2001 till 2004, he joined Tokyo Institute of Technology (Japan), as a research associate in the area of process systems engineering. From 2004 till 2008, he joined Okayama University (Japan) as a tenured Associate Professor, in the Division of Industrial Innovation Sciences. From 2007 till 2008, he was a Visiting Professor at the University of Toronto, in the Mechanical Engineering Department.

Dr. Gabbar has been successful in attracting national and international funds from a number of organizations including, Qatar National Research Foundation, NSERC, OCE, MaRS, and other industrial collaboration, including NSERC Discovery Grant on Resilient Interconnected Micro Energy Grids, and Regional Planning of Gas-Power Grids for Energy and Transportation Infrastructures with different fuel options in Ontario, Canada. His research have been widely recognized and reflected to his publications in patents, books, chapters, and journal and conference papers.

He has more than 210 publications, including patents, books / chapters, journal and conference papers. He been invited and participated in world-known conferences and delivered plenary talks on number of scientific events and through invitations to international universities, including: Alexandria University-Egypt, Helwan University-Egypt, Qatar University-Qatar, PI-UAE, Mayor of Nanjing-China, Tsinghua University-China, China University of Petroleum-China, UTM-Malaysia, Oil & Gas Industry-UAE / Kuwait, University of New Mexico-USA, Durham Strategic Energy Alliance (DSEA)-Canada, R&D Priorities to Integrate Natural Gas and Electricity infrastructure to Maintain Flexible-Canada, Canada Mission to China, Energy Hearing Committee in the House of Commons in Ottawa-Canada, and Canadian Workshop on Fusion Energy-Canada. He has supervised and hosted undergraduate, graduate, postdocs, visiting researchers and scholars from different countries including: Japan, India, Qatar, Egypt, Mexico, Malaysia, China, Brazil, Chili, UAE, and Colombia.

Dr. Gabbar has been active in developing and conducting educational and training courses and workshops for undergraduate, graduate students as well as for professionals from industry in the areas of energy safety and control engineering for nuclear, energy, and oil & gas facilities, including shutdown systems, safety design, safety verification, intelligent control and protection systems, integrity management, risk management, disaster management, and resilient energy infrastructures.

Dr. Gabbar has been active in leading national and international scientific and community events and activities, including: Nuclear Safety Standards within CSA – Canadian Standard Association, IEEE Annual Conference on Smart Energy Grid Engineering (SEGE), IEEE Nuclear and Plasma Sciences Society (NPSS) Symposium on Real Time Measurement, Instrumentation, and Control (RTMIC), IEEE Nuclear and Plasma Sciences Society Symposium on Plasma and Nuclear Systems (SPANS), and other international events. He is the Editor-in-Chief of the International Journal of Process Systems Engineering (IJPSE), and member of IEEE Smart Grid Committees.

### "Flywheel-Based Energy Storage Platform for Resilient Energy and Transportation Infrastructures"

Abstract: This talk will present research designs and control strategies and systems for flywheel-based energy storage platform. The talk will cover resiliency considerations and applications on energy and transportation infrastructures. In addition, the talk will discuss advances in interconnected micro energy grids with energy storage systems for transportation electrification, including e-Bus and railway networks. The talk will demonstrate modeling, control, and optimization techniques and their use for improved performance in terms of cost, environmental impacts, and energy supply and generation performance.

## **Keynote Speeches II**



Prof. Dennis Leung The University of Hong Kong, Hong Kong

**Bio:** Prof. Dennis Y.C. Leung received his BEng (1982) and PhD (1988) from the Department of Mechanical Engineering at the University of Hong Kong. He had worked with the Hongkong Electric Co., Ltd. for five years heading the air pollution section of the company before joining the University of Hong Kong in 1993. Professor Leung is now a full professor and associate head of the Department of Mechanical Engineering specializing in environmental pollution control and renewable & clean energy development. He has published more than 400 articles in this area including 240+ peer reviewed top SCI journal papers. He was invited to publish more than 20 review articles in leading energy and environment related journals. His current h-index is 56 and total citations are more than 13000. He is one of the top 1% highly cited scientists in the world in energy field since 2010 (Essential Science Indicators) and named as a Highly Cited Researcher by Clarivate Analytics in 2017. Prof. Leung has delivered more than 50 keynote and invited speeches in many conferences as well as public lectures.

Prof. Leung is a chartered engineer, a fellow of the IMechE and Energy Institute. He is also the Past Chairman of the Institute of Energy (HK Branch), and served as an editorial board member of a number of journals including and Applied Energy and Journal of Power & Energy. He is the Specialty Chief Editor of the Frontiers in Environmental Science since 2014. He currently serves as a board member of the Hong Kong Institution of Science, chairman and member of a few committees of the HKSAR government and appeal board panel related to sustainable energy and environment, as well as an external examiner of the IVE Engineering Programme. Professor Leung received numerous awards including the Outstanding Earth Champion Hong Kong award in recognizing his contributions in protecting the environment.

#### "Challenges and prospects of carbon mediation for the power and energy industry in China"

Abstrat: The great economic growth in China in the past three decades results in an enormous increase in energy demand as well as greenhouse gas emissions. China, as one of the largest economy in the world, has overtaken USA and became the top emitter of  $CO_2$  in the world a decade ago. China becomes the major contributor for global warming. The continual worsening of global warming and climate change triggers the global effort in reducing the atmospheric  $CO_2$  level. China has committed to reduce its carbon intensity by 60 to 65% of 2005 levels by 2030. This aggressive reduction target poses a great challenge to the central Chinese government as China's energy is fossil based and the current trend of high GDP growth will still be maintained in the near future. Issues such as how to convert the current carbon based energy structure to a non-carbon based structure, difficulties in the development of clean coal technologies and renewable energy etc. exist that will hinter successful implementation of carbon reduction measures. In this talk the challenges and the prospects of various carbon mediation measures adopted by the Chinese government will be discussed.

## **Plenary Speeches I**



### Prof. Frank Gunzer German University in Cairo, Egypt

**Bio:** 2017 Prof., Faculty of Information Engineering and Technology, German University in Cairo, Egypt 2014 Co-founder of the Center for Computational Engineering, German University in Cairo, Egypt 2011 Head of Electronics Engineering Department, German University in Cairo, Egypt 2010 Assoc. Prof., Faculty of Information Engineering and Technology, German University in Cairo, Egypt 2009 Guest Scientist in the research unit of Draeger, Luebeck, Germany (begin of a cooperation including regular research stays for research and development of pulsed ion mobility spectrometry as a tool for environmental monitoring)

Honorary Award:

2013/2017 Scholarship of the German Academic Exchange Service (DAAD) in the framework of the international scientific exchange program (WAP)

2004 Familie-Schindler-Foerderpreis Award for the doctoral thesis, Christian-Albrecht-University, Kiel, Germany

#### "Mass Spectrometry in fuel cell research"

Abstrat: Mass spectrometry can provide information about analyte masses present in a certain environment with very high precision at very high detection speed. It is therefore capable of analyzing the development over time of chemical reactions. In fuel cells, knowing e.g. the precise composition of the gas being brought into the cell and similarly the composition of the analyte gas leaving the cell helps to monitor and improve the energy production rate. In this talk, an overview will be given about the basics of relevant mass spectrometry variants used in fuel cell research and their successful application with focus on the development over the last ten years.

## **Technical Session**

## Sunday Afternoon, 25 March 2018, 13:30–17:00

Time	VIP Meeting Room 1 (5 <sup>th</sup> Floor)
13:00-15:50	Oral Presentation
15:50-16:10	Coffee Break
16:10-17:00	Poster Presentation

#### Note:

\* Please control each presentation time within 20 mins, including Q & A.

- \* The certificate of Oral presentations will be awarded at the end of each session.
- \* Best Presentation of each session is encouraged to award to student author prior.

\* Winner of Best presentation will be announced at the end of session and winner be will awarded the winner certificate at the banquet.

\* To show the respect to other authors, especially to encourage the student authors, we strongly suggest you attend the whole session.

\* The scheduled time for presentations might be changed due to unexpected situations, please arrive meeting room at least 10 Mins before Session starts.

\* Session photo will be taken at the end of the session and updated online.

Sunday, 25 Mar., 2018 13:30-15:50

**Oral Presentation** 

Room: VIP Meeting Room 1 (5<sup>th</sup> Floor) Chair: Prof. Hossam Gaber, University of Ontario Institute of Technology, Canada

EC004



Time: 13:30-13:50

Enhancement of Power Quality and Transient Stability Margin in coordination with UPFC and MB-PSS Controller

**Mr. Abubakar Siddique,** Waseem Aslam and Yonghai XU School of Electrical & Electronics Engineering, North China Electric Power University, China

Nonlinearity affects the stability, efficiency, and power quality of a power system, thereby causing low power frequency oscillation and decreasing transmission line loading capacity. The inflation of transmission systems caused by the brunt of power transfer capability on power market enterprises is crucial but the recent development of transmission systems is restrained due to coincidental deliberations and commercial complications. The use of flexible alternating current transmission system can be a significant option for improving the power capacity of transmission systems. In this study, a multi-band power system stabilizer controller is implemented in coordination with a unified power flow controller (UPFC) to enhance the power quality and dynamic voltage stability of electrical power networks. The control algorithms of the UPFC for series and shunt converters are constructed based on the MB- controller. Simulations were performed in MATLAB/Simulink software to investigate the achievements of the UPFC in enhancing dynamic voltage stability.

The performance of a designed controller is explored by using a multi-machine two-area test system. Simulation results indicate that the proposed coordinated controller demonstrates an excellent capability for increasing the power quality and dynamic stability margin of the system.

### EC005



Time: 13:50-14:10

Enhancement of Power Transfer capability and Contingency Analysis through FACTS Controller

**Mr. Waseem Aslam,** Abubakar Siddique and Yonghai XU School of Electrical & Electronics Engineering, North China Electric Power University, China

With the growing power demand, it is vital to expand power transfer capacity of transmission lines. But the new expansion in our present transmission system is confined due to financial problems, environmental concerns and health hazards due to electric and magnetic fields. May be its worthwhile option to use flexible AC transmission system (FACTS) for enhancement of power capacity of transmission system. In this paper, series FACTS devices SSSC and TCSC has been implemented. Main objective of this paper is to enhance or increase power capability of the lines. In addition, the contingency analysis using TCSC has been implemented to improve reliability of system. The system in consideration is radial network with one generator supplying the power to the load system. This paper proposes modeling and simulation of SSSC and TCSC in MATLAB/Simulink for increasing power capability of the lines.



Time: 14:10-14:30

Effect of Field Winding Inter-turn Short-circuit Positions on Rotor UMP of Turbo-generator

Mr. Qing-Fa Meng, Yu-Ling He, Ming-Xing Xu, Yu-Yang Zhang, Hong-Chun Jiang

Department of Mechanical Engineering, North China Electric Power University, Baoding, China

In this paper, the rotor unbalanced magnetic pull (UMP) characteristics of different field winding inter-turn short-circuit (FWISC) positions in turbo-generator are studied. Firstly, the qualitative analysis on the air gap magnetic flux density (MFD), as well as the rotor UMPs in X-direction and Y-direction, is carried out. Then the finite element numerical simulations are respectively taken to calculate the quantitative data of rotor UMP under normal condition and three different inter-turn short circuit positions. Finally, the change rules based on rotor UMP characteristics by experimental analysis are obtained. It is shown that the occurrence of FWISC will induce generally fundamental-frequency UMP acting on the rotor. Moreover, the different positions of FWISC are found to be sensitive to the rotor UMP amplitudes. The closer the short-circuit position is to the big teeth, the larger the rotor UMP amplitudes will be.



Time: 14:30-14:50

Analytical solution of single-line-to-ground faults in three-phase power systems

### Dr. Diego Bellan

Department of Electronics, Information and Bioengineering, Politecnico di Milano, Italy

This paper deals with the analytical evaluation of the transient current in single-line-to-ground fault in a three-phase power system. The proposed methodology is based on the Clarke transformation operating in the time domain. Due to the system asymmetry introduced by the single line fault, the modal circuits alpha, beta, and zero, related to the Clarke transformation, result in coupled circuits. A simple circuit representation of such coupling is derived, allowing straightforward evaluation of the fault current in the Laplace domain. Time domain behaviour obtained through inverse Laplace transform is validated by means of Simulink time-domain simulation of the single line fault.



Time: 14:50-15:10

Electricity Consumption Forecasting in Thailand using Grey Prediction Models

### Dr. Jukkrit Kluabwang

Rajamangala University of Technology Lanna Tak, Thailand

According to growing up of electricity demand and electricity consumption in each country, it is risk be a shortage or outage of electricity in the future if the forecasting information is inaccuracy. Energy planners have used several techniques for electricity consumption forecasting in order to predict more accurate future demand. There are two different grey prediction techniques that use in this paper to forecasting the electricity consumption in Thailand. The proposed tune-GM(1,1) is modified from the original GM(1,1) by adjusting a weight or alpha during generating of background sequence. Effect of alpha variation to the grey prediction accuracy were investigated. Actual data of electricity consumption in Thailand between 2004 and 2013 were used to modeling and between 2014 and 2016 were used to testing or validation approach. Mean average percentage error (MAPE) is selected to measure in accuracy view. The computational results show that the proposed tune-GM(1,1) can outperform the original grey prediction model (GM(1,1)).

## EC021-A



### Time: 15:10-15:30

SrTiO3 Nanocube doped Polyaniline nanoflakes Nanocomposite as Highly Stable Electrode Material for Supercapacitors

**Dr. Syed Shahabuddin**, R. Saidur and Numan Arshid Sunway University, Malaysia

The present study exhibits the simple approach for the synthesis of SrTiO3 nanocubes doped polyaniline nanoflakes (PANI) nanocomposites by in-situ oxidative polymerization methodolo-gy for fabricating electrode material for high performance supercapacitor application. The supercapacitor and electrochemical performance of the synthesised nanocomposites have been compared with bare PANI, SrTiO3 nanocubes and different compositions of SrTiO3 nanocubes doped polyaniline nanoflakes (PANI) nanocom-posites. The synthesised nanocomposites were characterised by various spectroscopic and sur-face analysis techniques namely, Fourier trans-form infrared spectroscopy (FTIR), field emis-sion scanning electron microscopy (FESEM), transmission electron microscopy (TEM), X-ray diffraction (XRD), thermogravimetric analysis (TGA), and BET. The nanocomposites were fabricated into electrodes to electro-chemical efficiencies analyse the employing cyclic voltam-metry (CV), galvanostatic charge-discharge (GCD) and electrochemical impedance spec-troscopy (EIS) in 1 M of KOH as an aqueous electrolyte. The electrochemical investigation reveals that the electrochemical performance of the nanocomposite doped with SrTiO3 nanocubes was higher as compared to the un-doped polyaniline nanoflakes. Moreover, the nanocomposite composition PANI-SrTiO3-250 exhibited the enhanced specific capacitance than that of pure SrTiO3, PANI nanoflakes, PANI-SrTiO3-500 and PANI-SrTiO3-750. The CV studies also indicated that PANI-SrTiO3-250 exhibited higher voltammetric current as compared to SrTiO3, PANI-SrTiO3-500 and PANI-SrTiO3-750 cells leading to improved capacitive nature. Also, the fabricated (activated carbon (AC)/PANI-SrTiO3-250) asymmetric supercapacitor device demonstrated cyclic re-versibility at a cell voltage of 1.5 V, which electrochemical re-vealed outstanding performanc-es. The nanocomposite also offered an enhanced life cycle capacitance retention after 4000 cy-cles.

EC3002

### Time: 15:30-15:50

A novel nitrogen-assisted method for the perovskite active layer optimization in the inverted planar heterojunction perovskite solar cells

**Dr. Miao Yu,** Xiaona Huang, Junze Shao and Wanli Zhang University of Electronic Science and Technology of China, China

The perovskite solar cells is recognized as a promising candidate for energy industry system because of its tunable band-gap, high absorption coefficient, broad absorption spectrum, high charge carrier mobility and long charge diffusion lengths. However, a dendritic grains morphology, caused by the spin coating procedure, will result in poor coverage and then low power conversion efficiency. In this work, a novel and facile inactive gas assisted method is introduced to obtain uniform and dense perovskite thin films. The dry nitrogen gas blows over the surface of the perovskite solution during the spin-coating process, which promote a faster solvent evaporation. Then, the uniform and compact perovskite film on the substrate was achieved. Typically, the power conversion efficiency (PCE) of the nitrogen gas assisted perovskite solar cells increases from 0.30% to around 9.5 %. Furthermore, the favorable start time of nitrogen blowing on devices was also investigated. The PCE stays around 9.46 % –9.78 % when the gas starts at 2 sec - 5 sec, and the efficiency decreases to 8.98 % if the gas starts at 6 sec. The nitrogen flow assisted method is proved to be an effective way to fabricate dense perovskite films without polluting the environment.

Sunday, 25 Mar., 2018 16:10-17:00

Poster Presentation Room: VIP Meeting Room 1 (5<sup>th</sup> Floor)

EC009



Operation Analysis of Energy Hub Considering Seasonal Load Characteristics

YANG Zhe, WEI Bengang, LI Da, **Mr. LING Zi**, YANG Xiu, ZHANG Meixia Shanghai University of Electric Power, Shanghai 200090,China

In order to do some further research on the operation of various coupling equipment in the integrated energy system, based on the concept of energy hub, this paper expounds the structure and operation mechanism of the energy hub, and establishes a universal energy hub model, and analyzes the relationship between power generating capacity, heat production capacity and cold load, heat load and electric load of energy hub. The operation of energy hub in the operation mode FTL(following the thermal load) and FEL(following the electric load) was compared. The simulation results show that the proposed model and calculation method can be used to analyse the coupling degree of different energy flow in the energy hub. Through the comparison and verification of the operation mode, the operation of the energy hub is more economic in the mode FTL, and is also conducive to the safe and stable operation of the power grid.



Voltage Deviation Forecasting with Improved BP Neural Network

ZHANG Yong, FANG Chen, **Ms. WANG Zhifang** and YANG Xiu Shanghai University of Electric Power, China

This paper presents an accurate model to forecast voltage deviation with improved BP neural network, which concerns with the meteorological factors. The proposed method is a combination of PCA dimension reduction ,AP clustering and BP neural network. In this paper, the PCA is used to reduce the dimension of the input data, and the AP clustering is employed to classify input data into clusters. Finally a forecast of voltage deviation is made by using BP neural network. The proposed method is successfully applied to real data. A comparison is made between the proposed method and the other methods. The practical application results proved that the mean absolute percentage error(MAPE) of the proposed method is 3.06%, and the probability of the relative error less than 3% is 54.17%, which are obviously better than that of the other methods.



Detecting Anomalous Users via Streaming Data Processing in Smart Grid

Zhichao Lai, Yuhao Li, Xinting Wang, Xiu Cao, Xuqi Zhang, **Mr. Wei Geng** and Yu Kang Fudan University, China

Anomalous user detection is an important concern in smart grid. Conduct the anomaly detection in real time with streaming data processing technology is a hot research field for smart grid maintenance. We first study the characteristics of power measurement data. Based on our findings, we adopt Clustream, an outlier detection model, for finding anomalous users. Combined with grid based DBSCAN algorithm, we achieve a two-phase flow processing architecture including offline and online phases for the goal of detecting anomalous user. The implementation details of our system are introduced. The experimental results show that our system can achieve better detection results.



Predicting Failures of High Voltage Electric Power Facilities via Multidimensional Information Analysis

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Efficient maintenance of the power grid is of great importance. This paper presents a multi-dimensional public information analysis based high voltage electric power facilities failures prediction mechanism, which aims at finding the critical facility. This approach helps finding failures, which will cause a lot of loses, in time and even in advance. We first summarize the factors that may cause failures on power facility. We then present our models for simulating the effects of these factors separately. A system that could highlight suspicious locations for power facilities routing inspection is demonstrated. Several experiments have been carried out to show the effectiveness of our approach. Our system as well as source codes are released at http://www.y-droid.com/FailurePreditionHV.



Short -Term Building Load Forecasting Based on Data Mining Technology

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Short-term building load forecasting is an important part of building energy efficiency management system to assess and diagnose energy consuming subsystem, optimize control and schedule planning. In this paper, K-Means clustering is used to cluster the daily load curve and the DBI evaluation index is used to determine the clustering number. In addition, the Pearson correlation coefficient is used to calculate the correlation coefficient between the load and its influencing factors. And then the classification rules are established by probabilistic neural network (PNN) to find out the basis of the clustering result. Finally, the BP neural network model optimized by particle swarm optimization is used to predict the load value of one day in the future. The prediction and verification of a building load data of Shanghai proves the rationality and effectiveness of the model.

Research and Application of Improved Genetic Algorithm Targeting Load Balancing in Distribution Network Reconfiguration

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In this paper, a distribution network reconfiguration method considering load balancing is proposed in order to reduce the level of overloaded equipments and balance the network load allocation. The improved genetic algorithm is proposed to solve the model quickly, which takes full account of the characteristics of radial wiring in distribution network. The special coding method is adopted to ensure that the distribution grid remains radial in the whole genetic algorithm calculation process. The distribution network reconfiguration method proposed in this paper not only considers the load balance, but also greatly reduces the level of overloaded equipment. It can be seen from the calculation results of the 14-node system example that the method in this paper provides the best solution.

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## One day tour in Shanghai

### No.1 Oriental Pearl Radio and television tower



The Oriental Pearl Tower is second only to the Toronto TV Tower in Canada and the Moscow TV Tower in Russia. The Oriental Pearl TV tower has chosen the circular curve of the oriental nation as the basic building line. The main body consists of three inclined cylinders, three straight cylinders and 11 spheres, forming a huge space frame structure. There are 6 elevators in the barrel, one of which is a double deck elevator that can carry 50 people, and one is running between the upper sphere and the space capsule. The tower body is available for sightseeing, such as the lower sphere, the middle sphere and the ring corridor, the upper sphere and the space warehouse, etc. The top of the ball is 118 meters high, with a sightseeing corridor and a dream space city. The top is 295 meters high, with a revolving tea room, a restaurant and a 1600 person sightseeing platform. There are 5 balls between the ball and the ball. Under the control of the computer, the light can be automatically adjusted according to the weather change, producing more than 1000 kinds of changes. The lighting effect of the TV Tower is also breathtaking. Take the elevator to the Oriental Pearl Tower, only forty seconds to reach 263 meters sightseeing ball, here, as far as the panoramic view of Shanghai, the original edifice, now seem very small, winding on the Huangpu River, the ship flies, fell into the sea. Two bridge on both sides of the breakdown, such as the two dragon, fly in the Huangpu River, together with the middle of the Pearl of the Orient, a huge picture into a clever combination of the two. At night, a huge sphere in the colorful light decoration, outshine the stars, more The brightness dazzles the eyes., crystal clear. The light building in the Bund, Puxi, shows the charming night of the generation of metropolis. The tower is integrated with the Pudong Park, which is extended to 155 thousand square meters. There are two huge balls in the park, which are 15 balls and different sizes. There are also entertainment centers and commercial centers in the vicinity, which will be large and multi-functional tourist attractions in Pudong. It has become one of the 90s ten Shanghai landscape "and" top ten tourist attractions.

### No.2 The Bund



The Bund, for hundreds of years, has been used as a symbol of Shanghai appeared in front of the world, it is located in the Waibaidu Bridge Nanpu bridge to the West Bank of the Huangpu River, a total length of 4 kilometers, is one of Shanghai in 90s ten new landscape and top tourist attractions. The Bund is the east side of the Huangpu River and the mighty beautiful the Bund new embankment, here, tourists can enjoy the Shanghai mother New River, Huangpu River style, overlooking the other side in Lujiazui area after Pudong, or take a walk in the green trees flower beds, feelings of city gardens have a distinctive flavour, enjoy the metropolis rare fresh air sunshine.

On the west side of the Bund, there are many different styles and western buildings, which show the "Far East Wall Street" style. Today it is called the building group of "the Universal Building Expo". Only North Waibaidu Bridge, South East Jinling Road, 1.5 kilometers of this section, it stands 52 blocks of row upon row of various style building, a Gothic, Baroque style, Rome style, classical style, Renaissance, Chinese and Western Wall etc.. With a loud bell, the customs building figure is always the first to cause visitors attention, the customs building is the main building, the Bund buildings built in 1927, designed by British designer Werwilson. The appearance of the building with European classical and modern combined eclectic style. It was made in the big bell style of Houses of Parliament in London, England, and was assembled in Shanghai after the British built. It is one of the most famous bells in the world.

### No.3 Yu Garden



Yu Garden is located in Shanghai City, the old northeast of Chengxiang, North Road, Anren East Street, Shanghai to the southwest and adjacent to the old temple, is a famous classical garden in Jiangnan, the famous tourist attractions and places of historic interest and scenic beauty, national key cultural relics protection units.

Yu Garden was originally a private garden in the Ming Dynasty, built in Jiajing and Wanli, dating back more than four hundred years of history. Park owner Pan Yunduan, former governor of Sichuan. His father Paine, the word Zi Ren, No. Li Jiang, officer to duchayuan left Yushi and Xingbu shangshu. The pan family was the great Wang gate of Shanghai at that time. Ming Jiajing thirty-two years (1553), up to nine in the Shanghai city wall was built, and the southeast coast of the Japanese who died down, more than twenty years of life often threatened property of the people of Shanghai have a little social stability, economic recovery and prosperity. The scholar bureaucrats have built gardens, romance, romantic music. Old Paine resign retire, Pan Yunduan in order to let the father to age, from the Ming Jiajing year (1559) has, in the residential pan world spring Hall West of several vegetable plot, stone cutting pool, pavilion structure Yi Zhu, the construction of a garden. After twenty years of painstaking efforts, built the Yu Garden. "Yu" and "peace" and "ing", named "Yu Garden", "Yu Yue Laoqin".

### No.4 Expo Park in Shanghai



The World Expo site in Shanghai is located between the Nanpu bridge and the Lupu Bridge, along the Huangpu River in the Shanghai city. Expo planning area of 5.28 square kilometers, the park is divided into 5 major venues, are independent pavilions, pavilion, pavilion group group, group and group Chinese Museum museum.

Shanghai Expo Park 5 venues group respectively independent pavilions, pavilion, pavilion, group group group and China Theme Pavilion Hall group, the independent museum buildings will be concentrated in the Huangpu River, each building consists of a national capital construction, to showcase the country's scientific and technological achievements; Pavilion in the building a part will be built jointly by some countries; some other buildings will be China funded, then leased to the participating countries; museum buildings enterprises will become the international exhibitors place.

### No.5 Longhua Temple



The Longhua Shanghai temple is the oldest, largest temple, dating back more than 1700 years of history, from the temple of Buddhist Maitreya Buddha in Longhua under the tree Buddha allusion. The Longhua Temple Temple mostly Qing Tongzhi, Guangxu years of construction, and kept the temple in the Song Dynasty seven hall system format, followed by the Maitreya temple, king hall, main hall, three Temple Abbot room, and the floor.

King hall side bell tower is 3 storeys high, hanging 20 years of the Qing Dynasty Qinglong cast bronze bell, about 2 meters high, 1.3 meters in diameter, weighs 5 tons, "Longhua bells" is the former "Shanghai eight" one. The upstairs collection of various versions of the Buddhist scriptures, Buddhist scriptures and all kinds of precious cultural relics, including the Ming Dynasty called Longhua Temple "temple Sambo" chici Tripitaka 718 years letter; Fan Jin Chiba lotus Vairochana Buddha; Yuci a gold seal.

## MEMO
