2018 2nd International Conference on Power and Energy Engineering (ICPEE 2018)

Xiamen, China

Sept 3-5, 2018

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Welcome to HKCBEES 2018 conference in Xiamen University of Technology, China. The objective of the Xiamen conference is to provide a platform for researchers, engineers, academicians as well as industrial professionals from all over the world to present their research results and development activities in Power and Energy Engineering.

**2018 2nd International Conference on Power and Energy Engineering (ICPEE 2018)**

- **Paper publishing and index:** ICPEE 2018 papers will be published in the conference proceeding.

IOP Conference Series: Earth and Environmental Science (EES) (ISSN: 1755-1315), which is indexed by EI Compendex, Scopus, Thomson Reuters (WoS), Inspec, et al.

- **Conference website and email:** [http://www.icpee.org/](http://www.icpee.org/) ; peeng@cbees.net.
Conference Venue

Network Management Division, Xiamen University of Technology
厦门理工学院信息中心

No.600 Ligong Road, Jimei District, Xiamen, 361024, Fujian Province, China
厦门市集美区理工路 600 号
http://english.xmut.edu.cn/

Recommended Hotels:
Xiamen Blue Peninsula Hotel (厦门蓝湾半岛酒店)
Royal Seaside Resort Hotel and Hot Springs Xiamen (厦门罗约海滨温泉酒店)
### Detailed Schedule for Conference

**Sept 3, 2018 (Monday) 9:00~12:00**

**Onsite Registration:** Lobby of Network Management Division, Xiamen University of Technology

### Afternoon Conference

**Venue:** Information Centre Reporting Hall

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>13:00~13:45</td>
<td>Opening Ceremony</td>
</tr>
<tr>
<td>MC:</td>
<td>Prof. Gordon Huang, University of Regina, Canada</td>
</tr>
<tr>
<td></td>
<td>Greetings from the following people:</td>
</tr>
<tr>
<td></td>
<td>- Leaders of XMUT, CICETE, UNDP, Coca Cola Water Program</td>
</tr>
<tr>
<td></td>
<td>- Leaders from local government</td>
</tr>
<tr>
<td></td>
<td>- Distinguished guests</td>
</tr>
<tr>
<td>13:45~14:20</td>
<td>Keynote Presentation I</td>
</tr>
<tr>
<td>(Prof.</td>
<td>Yongping Li from Beijing Normal University, China and Xiamen</td>
</tr>
<tr>
<td>Yongping</td>
<td>University of Technology, China)</td>
</tr>
<tr>
<td>Li)</td>
<td>Topic: “A modeling approach for planning national-scale energy and</td>
</tr>
<tr>
<td></td>
<td>environmental systems”</td>
</tr>
<tr>
<td>14:20~14:55</td>
<td>Keynote Presentation II</td>
</tr>
<tr>
<td>(Prof.</td>
<td>Gordon Huang from Faculty of Engineering and Applied Science,</td>
</tr>
<tr>
<td>Gordon</td>
<td>University of Regina, Canada)</td>
</tr>
<tr>
<td>Huang)</td>
<td>Topic: “Stochastic Rainfall-Runoff Modeling under Climate Change”</td>
</tr>
<tr>
<td>14:55~15:10</td>
<td>Coffee Break &amp; Photo Taking</td>
</tr>
<tr>
<td>15:10~17:40</td>
<td>Session 1:</td>
</tr>
<tr>
<td></td>
<td>Session Chair: Dr. Weidong Zhang and Ning Zhang</td>
</tr>
<tr>
<td></td>
<td>10 presentations and forum discussions-Topic: “Workshop on Environment, Water and Energy”</td>
</tr>
<tr>
<td></td>
<td>Dinner:18:00</td>
</tr>
<tr>
<td></td>
<td>Venue: Wei Ai Restaurant</td>
</tr>
</tbody>
</table>

- 4 -
# Sept 4, 2018 (Tuesday) 8:55~17:30

**Venues:**
- Information Centre Reporting Hall
- Administration building 301
- Administration building 501

## Morning

**Venue:** Information Centre Reporting Hall

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:55~9:00</td>
<td><strong>Opening</strong>&lt;br&gt;MC: Prof. Yongping Li, Beijing Normal University and Xiamen University of Technology, China</td>
</tr>
<tr>
<td>9:00~9:35</td>
<td><strong>Keynote Presentation III</strong>&lt;br&gt;(Prof. Wang Shuguang from School of Environment Science and Engineering, Shandong University, China)&lt;br&gt;Topic: “The fate and transfer mechanisms of antibiotic resistance genes during bio-electrochemical treatment of chloramphenicol wastewater”</td>
</tr>
<tr>
<td>9:35~10:10</td>
<td><strong>Invited Presentation I</strong>&lt;br&gt;(Prof. Anna Won from School of Architecture, Kyungpook National University, Republic of Korea)&lt;br&gt;Topic: “Survey on the Operation of the District Energy Supply System in Japan According to Secular Change”</td>
</tr>
<tr>
<td>10:10~10:30</td>
<td><strong>Coffee Break &amp; Photo Taking</strong></td>
</tr>
<tr>
<td>10:30~12:00</td>
<td><strong>Session 2</strong>&lt;br&gt;Session Chair: Prof. Haiyan Fu&lt;br&gt;6 presentations-Topic: “Information Theory and Market Economy”</td>
</tr>
<tr>
<td>12:00~13:00</td>
<td><strong>Lunch</strong>&lt;br&gt;Venue: Wei Ai Restaurant</td>
</tr>
</tbody>
</table>
### Afternoon

**Venue:** Information Centre Reporting Hall / Administration building 301 & 501

<table>
<thead>
<tr>
<th>Session 3: 13:00~15:15</th>
<th>Session 4: 13:00~15:30</th>
<th>Session 5: 13:00~15:45</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Venue:</strong> Information Centre Reporting Hall</td>
<td><strong>Venue:</strong> Administration building 301</td>
<td><strong>Venue:</strong> Administration building 501</td>
</tr>
<tr>
<td>Session Chair: Prof. Jassada Sarasook</td>
<td>Session Chair: Prof. Rodrigo Munoz and Jiangxue Long</td>
<td>Session Chair: Prof. Jianhua Yang and Zhen Hu</td>
</tr>
<tr>
<td>9 presentations - Topic: “Wind power generation and control”</td>
<td>10 presentations - Topic: “High voltage technology and fault diagnosis”</td>
<td>7 presentations - Topic: “Electronic information technology and application”</td>
</tr>
</tbody>
</table>

**Coffee Break 15:15~16:00**
**Poster Session**
**Chair:** Prof. Yongping Li
25 poster presentations

<table>
<thead>
<tr>
<th>Session 6: 16:00~17:00</th>
<th>Session 7: 16:00~17:30</th>
<th>Session 8: 16:00~17:30</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Venue:</strong> Information Centre Reporting Hall</td>
<td><strong>Venue:</strong> Administration building 301</td>
<td><strong>Venue:</strong> Administration building 501</td>
</tr>
<tr>
<td>Session Chair: Prof. Yang Zeng</td>
<td>Session Chair: Prof. Huiyan Cheng</td>
<td>Session Chair: Dr. Lei Wang and Zhineng Dai</td>
</tr>
</tbody>
</table>

**Dinner:** 18:00
**Venue:** Wei Ai Restaurant

### Sept 5, 2018 (Wednesday) 9:00~17:00

**One Day Visit and Tour**

Note: (1) The registration can also be done at any time during the conference.
(2) The organizer doesn’t provide accommodation, and we suggest you make an early reservation.
(3) One best oral presentation will be selected from each oral presentation session, and the Certificate for Best Oral Presentation will be awarded at the end of each session on Sept 3 & 4, 2018.
(4) As well as the best poster presentation will be selected from poster session, and the certificate for Best Poster Presentation will be awarded after this session on Sept 4, 2018.
Table of Contents

Presentation Instructions .......................................................... 14
Keynote Speaker Introductions ..................................................... 15

Session 1
K0049: Aquaculture wastewater treatment with immobilized microorganisms-aquatic plants strengthened purification system 19
  **Huiyan Cheng, Jiangxue Long, Z Liu**
K3009: Treatment of candied fruit wastewater by adsorption oxidation combined process 19
  **Mengxiang Zeng**
K3032: Research on the Cellulase Hydrolysis of Colocasia Antiquorum in Producing Ethyl Alcohol 19
  **Hui Zhi Yan, H Y Fu, G X Su, D Zhao, Y C Wu, J F Liu, P F Gao, Y T Huang**
K0025: Study on thermal performance of a phase change thermal storage device by utilizing off-peak power 20
  **Bo Tang, Q H Shangguan and Y Lu**
K0033: The Profit Influence of Additional Heat Sources on Combined Heat and Power System in Existing Peak Shaving Compensation Mechanism 20
  **Y Bai, J X Qin, Qi Guo and Z K Yi**
K3036-a: Two attempts to optimize n-damo process through optimization of methane availability: static pressure and immobilization 20
  **Zhen Hu, Yinan Wang, Dongyun Ru**
K0067-a: Sources attribution of atmospheric ammonia using stable hydrogen and nitrogen isotopes 21
  **Yang ZENG, Jing LIU**
K0068-a: Investigetation of fate and behavior of tetracycline in nitrifying sludge system 21
  **Chao Song, Xue-Fei Sun, Peng-Fei Xia, Yun-Kun Wang, Shu-Guang Wang**
K0069-a: Bioaerosol Transformations across an Air-Conditioning Cooling Coil 22
  **Yan Wu, Jiahui Rong and William W Nazaroff**
K5005: Modeling Method for the Initial Speed Degradation of a certain Type of Machine Gun Barrel 23
  **Yonghai Shan, Xianming Gao, Cheng Xu**

Session 2
K4001: SDN-based Management Framework for IoT 24
  **Chin-Shiuh Shieh, Jhih-Ying Yan, and Hao-Xiang Gu**
K4002: Traffic Accident Time Series Prediction Model Based on Combination of ARIMA and BP and SVM

*Xiaorui Shao*

K4005: A Study on Customers’ Sentiment analysis Based on Big Data Using Twitter Data

*Xiaorui Shao*

K3001: Micro-weather station system for small geographical coverage in the Philippines

*RODRIGO C. MUÑOZ, JR, X S Yumang, S J A Japitana, K R C Medina and J E T Tibayan*

K3011: Influence Oil Price towards Economic Indicators in Russia

*Anthony Nyangarika*

K5006: Study on Structural Characteristics and Evolution of China Regional Investment Network

Xiaohong Chang, and *Lihong Chang*

### Session 3

K0008: Research on Short-term Prediction Method of Substation Bus-bar’s Voltage Trend Based on Multidimensional Time Series Data Mining

*Fei Xiao, Xiwu Leng, Kang Ye, Youlin Hu, Xiongli Li, Licheng Zhu*

K0026: Design of Rated Power Control Strategy of Wind Turbine Based on Particle Swarm Optimization

*Yongchang Yang, Y Liu, P Song, Y Cui, and Y Bai*

K0028: Impact of wind generators number and location on the resonance risk of wind farm integration through flexible HVDC system

*Xiao Wang, Xiaobao Hu, Hui Liu, Linlin Wu and Sijing Sheng*

K0037: Suppression Methods for Low Frequency Oscillation of Wind Farm Considering SVG Minimum Output Dead Zone

*Yangfan Zhang, Xu Xie, Peng Song, Hui Liu, Tao He*


*Maxime Binama, Wei-Hua Cai, Wen-Tao Su, Feng-Chen Li, Xian-Zhu Wei, Alexis Muhirwa*

K1006: Research on reduced scene sets based on ARMA model of wind farms day-ahead total output forecasting

*Hui chao WANG, Lei LIU, Jin hui MA, Jie DING and Chang ZHOU*

K1008: Rotation Speed Recovery Strategy Based On Variable Power Curve of Inertia Control from DFIG Wind Turbine
**Rui Liu, P Song, X S Wang and Z W Lin**

K1010: Review on Target Tracking of Wind Power and Energy Storage Combined Generation System

**Xuewei Guo, Man Xu, Linlin Wu, Hui Liu and Siqing Sheng**

K3026: Method on Condition Assessment of Pitch System based on Fuzzy Matter-element Analysis

*Zhao Shuangxi, Zhang Lei, Hou Lijun, Xiao Cheng and Zhu Xipan*

**Session 4**

K0017: Improved Control Strategy for AC-Filters Switching in UHVDC Converter Station

*LI Hui, WANG Xiaofei, YU Bin, LIU Haifeng, XU Hao, GUO Siyuan*

K0021: Researches on Two Kinds of Fault Restart Logic of Qishao ± 800 kV UHVDC Project

*Hao Xu, Lei Zhang, Haifeng LIU, Wenwu LIANG, Hui LI*

K0048: Study on Influence Factors of Lightning Impulse Test Waveform of UHV GIS Equipment

*Jiadong Meng, Tianxiang Chen, Dajin Chen, Rongquan Wang and Lei Wang*

K0050: Electric Field Analysis on Buffer Layer of HV XLPE Power Cable by Finite Element Method

*Weiwei Zhang, Youxiang Yan, Weiling Lin, Shanshan Li and Lei Wang*

K1009: Study on the Subsynchronous Resonance Control Method Based on the DFIG Grid-Side Converter

*Meng Xue Yin, H Liu, Y H Li and W Song*

K0006: Fault Diagnosis of Gas Turbine Based on Improved BP Neural Network with the Combination of N-W and L-M Algorithm

*Zhang Yun, Qian Yu-liang, Qiu Zheng and Zhang Xiao*

K0024: Research and verification of setting value coordination method considering the responding deviation of under excitation limit and loss of excitation protection for generator

*Quan HONG, Li LI, Haifeng LIU, Wenqi MAO, Wenjun LU*

K1007: Grounding Fault Analysis and Protection Measures Study of Composite Grounding Arc-suppression Modes

*B Yu, H Li, W J Zhu, H F Liu, W W Liang, Z D Zhang, S Y Guo*

K3020: Improvement of performance calculation methods for pulverized coal and blast-furnace gas co-fired boilers

*Yalan Ye, Hongming Wang, Xiang An, Wenhao Jiang*

K3021: Research on Intelligent Diagnosis Strategy of Secondary Device Abnormality in Smart Substation
**Meizi Hong, Peng Li, Di Wu, Bo Wen, Hengxuan Li**

**Session 5**

K4006: Effect of Different Reductants on Leaching Lithium and Cobalt from Lithium Ion Batteries in Tartaric Acid Solution

*Qian Cheng*

K0016: Routing Architecture of Software Defined Energy Internet

*Dilin Mao, Xiu Cao, Xinyang Han, Chengzhi Zhu and Wei Geng*

K3012: Space Vector Flux Weakening Control of PMSM Drivers

*Gen Tao Dong, Jianfei Yang, Xin Qiu, Xun Liu and Cao Wei*

K3031: IPv6-based ECG Monitoring System

*Jianqiang Hu, Wei Liang, Gang Wu and Jia Hao He*

K3033: Application of point cloud data in the construction and management of interior design

*Minyong Li and Jianwen Liu*

K3034: The Application Research of Oblique Photogrammetry Technology in Road Planning

*Zhihuang Zheng*

K3035: Research on LED Advertising Display Wireless Control System Based on MT6589

*Yizhou Mao, Yingchao Xu, Subin Wang, Weiping Zhu*

**Session 6**

K0011: The numerical simulation of a high power Hall effect thruster

*Lai Li, Hulin Huang, Xidong Zhang, Guiping Zhu*

K0023: Tuning Approach for Power System Stabilizer PSS4B using Hybrid PSO

*Siyuan Guo, Shoushou Zhang, Junying Song, Yongsheng Zhao, Weijun Zhu*

K0046: Short-term electricity load forecasting in Thailand: an analysis on different input variables

*Su Wutyi Hnin and Chawalit Jeenanunta*

K0005: The Research of Anomaly Detection Method for Transformer Oil Temperature Based on Hybrid Model of Non-Supervised Learning and Decision Forests

*Fei Xiao, Xiwu Leng, Kang Ye, Youlin Hu, Xiongli Li, Licheng Zhu*

**Session 7**

K0035: Optimizing Thermal Performance of Data Centers with Novel Local Partition Configurations

*Hongjie Lu and Zhongbin Zhang*
Withawint Srisuriyajan and C Thongchaisuretrakul

K0041-a: Energy and ancillary service dispatch by using DPSO-SQP
Weiri-Min Lin, Chung-Yuen Yang, Ming Tsai, Yun-Hai Wang

K0044: The unit commitment model and analysis for promoting clean energy consumption with considering of tie line plan adjustment
Xu Zhang, Xinhong Shi, Bingquan Zhu, Ke Sun and Yanwei Xiao

K0047: Study on Modification of Phase Change Energy Storage Materials Suitable for Biogas Fermentation
Zhipeng Yang, Jinheng Li, Anxing Lai, Gang Li and Lei Wang

K1004: The capacity optimization of the energy storage system used for peak load shaving
Kai Deng, Xiaobo Tang, Jie Lei, Zhenyao Qian and Bangcheng Wei

Session 8

K0003: Droop control Based Seamless Transfer Strategy for Three-phase Converter in Microgrid
ZHao Guopeng, ZHOU Xinwei, YANG Hongwei, XU Feng and WANG Yanjie

Jingbo WU, Jianling ZHANG, Weijun ZHU, Dijun HU, Xinfan JIANG, and Wei ZHONG

K0038: Deep learning algorithm for preliminary siting of substations considering various features in distribution network planning
Liang Feng, Can Cui, Runze Ma, Jian Wu, Yang Yang, Lujie Qi, Xiaolei Zhang, Shengyuan Liu

K1005: Study on Power Quality Impacts of Rural Distribution Network with Large-scale Heat Pumps
Zhenwei LI, Wenliang ZHU, Pengfei SUN, Siyao HU, Kaiyuan JIN and Jianhua YANG

K2006: The Power Grid Development with Distributed Wind Plant Growth Based on Coordination Analysis
Tan Yudong, Li Xianghua, Zhang Pengfei, Li Yong, Peng Dong

Zheng Zhang, Tianran Li, Quan Liu, Chao Yuan

Poster Session

K0010: Study on Data Selection Method of Historical Operation Data for Large Scale Power System
Hongyang Dai, Ying Lv, Zhihong Yu, Guangming Lu, Chang Xie and Jinxiu Hou
K3016: Design and Energy Efficiency Management of Cascade Hydropower System

Guanlu Yang, Zehong Huang, Shuyang Wang and Minxu Wu

K0001: Fault ride through strategy for Virtual Synchronous Control based Doubly-Fed Induction Generators

Xuekun Cheng, Hui Liu, Peng Song and Hao Jiang

K0040: Study on the electrochromic label for high-voltage equipment with wo3

Linong Wang, Enwen Li, Bin Song and Yaqi Fang

K0036: Analysis of Hierarchical and Time-phased Model of Large-scale Power Grid Based on Fp-growth Algorithm

Tianyue Wang, Jinxiu Hou and Zhihong Yu

K3015: Power Quality Monitoring and Energy Efficiency Management of Microgrid based on wind-PV-ES Hybrid System

Guanlu Yang, Minxu Wu, Yang Wang and Zehong Huang

K3028: The study of banana leaf fiber based biomass pellets fuel

Xinwen Wang, Shimin Wu, Xin Rao, Jie Chi, Su Xu

K3010: The Effect of Silicon Fertilizer on The Growth of Chives

LONG Jiang-xue, CHENG Hui-yan, DAI Zhi-neng, LIU Jian-fu

K3029: Application of Deodorant in Odor Control of Municipal Solid Waste

Zhineng Dai, F S Zeng, J Liu, A L Yang and H Y Fu

K3023: Hierarchical topology analysis method for substations based on electrical bays

Xie Zhang, Z F Xu, B Zhou, H F Wang and H X Pan

K3025: Research on Logic Optimization and Reliable Calculation Model of Satellite Based Wildfire Monitoring for Power Transmission Line

Zhenzhen Zhou and Gang Chen

K1002: Preferably Receiving End’s Infeed Modes for UHVDC Power Transmission

Zhen Bi, Qiang Guo, Qinyong Zhou, Yilang Jiang, Xiaohui Qin

K1001: Small-Signal Modelling and Stability Analysis of Current-Controlled Virtual Synchronous Generators

Dawei SUN, H LIU, P SONG, S ZHU and Z WEI

K0027: Research on improved droop control strategy based on virtual impedance

Xiao Min Liu, B C Lu, Z P Ren and R X Zhang

K0022: A new software phase-locked loops

Cunbing Gui, Zhangbao Chen and Xuehui Luo
<table>
<thead>
<tr>
<th>Session Code</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>K3030</td>
<td>Interpolation estimation method of tropospheric delay for long baseline network RTK based on support vector machine</td>
<td>Jian Deng, Miaoqiang Xu, Xuexiang Yu</td>
</tr>
<tr>
<td>K1003</td>
<td>Performance analysis of the BIPV of an industrial park in Wuhan</td>
<td>Ba Jingkang, Huang Xiaoli, Yan Guogang and Wang Xiaoqing</td>
</tr>
<tr>
<td>K0034</td>
<td>Optimal design of distributed energy systems in rural area of developing country: a case study of Guanzhong area, China</td>
<td>Y Zhu, X X Yan and Quanling Tang</td>
</tr>
<tr>
<td>K0045</td>
<td>Study on Performance Optimization of SCR Denitrification of an Ultra-low Emission Coal-fired Power Unit</td>
<td>Li Bing, Song Yongqiang, Zhang Qilong, Zhou Can and Duan Haoran</td>
</tr>
<tr>
<td>K3005</td>
<td>Oil Price Factors: Forecasting on the Base of Modified ARIMA Model</td>
<td>Anthony Msafiri Nyangarika, Bao-jun Tang</td>
</tr>
<tr>
<td>K3006</td>
<td>DSGE Model of the Russian Economy: Economic Impact of Oil Price</td>
<td>Anthony Msafiri Nyangarika and Bao Jun Tang</td>
</tr>
<tr>
<td>K2001</td>
<td>Coordination of Multistage Scheduling Strategy in Cogeneration System</td>
<td>Zhenyu Li, Dong Zhao, Qing Ye and Guibo Ma</td>
</tr>
<tr>
<td>K2002</td>
<td>Power Grid Partition Method for Black Start Based On Complex Network Theory</td>
<td>Xu Fubin, Zhang He, Li Run, Cai Jian</td>
</tr>
<tr>
<td>K2004</td>
<td>Development of a Comprehensive Transformer Material System Analyzer</td>
<td>Yuan Gao, Zhiwei Zhao, Xinyu Wang and Xin Hu</td>
</tr>
<tr>
<td>K2005</td>
<td>Research on steady-state power distribution calculation technology of electrothermal coupled regional energy system</td>
<td>Jinning Shan, Zhenyu Li, Gang Chen and Xin Wang</td>
</tr>
</tbody>
</table>

List of Listeners |
One Day Visit and Tour |
Note |
Feedback Information
Presentation Instructions

Instructions for Oral Presentations

Devices Provided by the Conference Organizer:
Laptop Computer (MS Windows Operating System with MS PowerPoint and Adobe Acrobat Reader)
Digital Projectors and Screen
Laser Sticks

Materials Provided by the Presenters:
PowerPoint or PDF Files (Files should be copied to the Conference laptop at the beginning of each Session.)

Duration of each Presentation (Tentatively):
Regular Oral Presentation: about 12 Minutes of Presentation and 3 Minutes of Question and Answer
Keynote Speech: about 30 Minutes of Presentation and 5 Minutes of Question and Answer

Instructions for Poster Presentation

Materials Provided by the Conference Organizer:
The place to put poster

Materials Provided by the Presenters:
Home-made Posters
Maximum poster size is A1
Load Capacity: Holds up to 0.5 kg

Best Presentation Award
One best oral presentation will be selected from each oral presentation session, and the Certificate for Best Oral Presentation will be awarded at the end of each session on Sept 3 & 4, 2018.
As well as the best poster presentation will be selected from poster session, and the certificate for Best Poster Presentation will be awarded after this session on Sept 4, 2018.

Dress code
Please wear formal clothes or national representative of clothing.
Keynote Speaker I

Prof. Yongping Li
Beijing Normal University, China & Xiamen University of Technology, China

**Prof. Yongping Li** is a Changjiang Scholar Professor at Beijing Normal University, China. She receives her MSc and PhD Degrees from the University of Regina, Canada. Her research interests involve in energy and environmental systems analysis, environmental pollution control, water resources management, and decision making under uncertainty. Since 2005, Li has led or involved in over 50 energy- and environment-related research projects supported by industrial, governmental and international organizations. She has produced over 270 peer-refereed international journal papers (with an SCI-based H-index of 35 in Science Citation Index under Thomson Reuters' Web of Science), and supervised over 50 Master/PhD students. Dr. Li was received a number of awards such as Distinguished Young Scientist Award, New Century Excellent Talents in University, the National Natural Science Funds for Distinguished Young Scholar, the National Award for Youth in Science and Technology, and the National Award for Youth Female Scientist.

**Topic:** “A modeling approach for planning national-scale energy and environmental systems”

Abstract: Environmental problems associated with social and economic development have been growing concerns faced by the Chinese government. Environmental pollution can not only pose a variety of impacts on public health, but also hinder national/regional sustainable development. Energy sector is a major contributor since China continues to have heavy reliance on nonrenewable energy resources such as coal, oil and natural gas. Many conflict-laden issues such as the growing population, the boosting economic development, the increasing energy demand, the deteriorating environmental quality, and the shrinking resource availability have called for more effective planning of energy and environmental systems. Energy models are capable of understanding the linkage between energy exploitation/generation/utilization, economic sustainable growth, as well as environment/climate change impact mitigation. In this research, a national-scale energy and environmental management model is developed and the software technology gets further implemented based on analysis and prediction of energy demand in China. In the developed model, various end-use and service demands for energy under baseline scenario and pollutant-emission-reduction scenario are predicted according to the national long-term socio-economic development goal; a number of constraints such as fuel prices, energy process/generation technologies, energy supply/demand, environmental capacity, conversion efficiency, and clean energy development are considered. The results cannot only provide optimal energy resource/service allocation and capacity-expansion plans, but also help decision-makers identify desired policies for pollutant mitigation with a cost-effective manner.
Keynote Speaker II

Prof. Gordon Huang

Faculty of Engineering and Applied Science, University of Regina, Canada

**Prof. Gordon Huang** is a Tier 1 Canada Research Chair in Energy and Environment, and Executive Director of the Institute for Energy, Environment and Sustainable Communities at the University of Regina, Canada. He holds BSc from Peking University (China), MSc from Simon Fraser University (Canada) and PhD from McMaster University (Canada). Since the 1990s, Huang has led over 150 research projects, produced over 800 peer-refereed international journal papers (with an SCI-based H-index of 51 in Science Citation Index under Thomson Reuters’ Web of Science), and supervised over 100 Master/PhD students (with degrees awarded). Over 20 Huang's PhD graduates were appointed as faculty members at universities in Canada, USA, China and Singapore. He is a Fellow of the Canadian Academy of Engineering, and the President of the International Society for Environmental Information Sciences. He also acts as editor-in-chief for Journal of Environmental Informatics (http://www.iseis.org/JEI/), and served the United Nations Development Programme as Chief Scientist for a program of Rural Water Resources Management and Drinking Water Safety. His pioneering work in environmental risk management has been recognized as a significant innovation, and has influenced government and business approaches for tackling environmental challenges and formulating related policies.

**Topic: “Stochastic Rainfall-Runoff Modeling under Climate Change”**

Abstract: Climate change has led to challenges to watershed management due to changed frequency and severity of extreme weather events, such as heat/cold waves, storms, floods and droughts. In this study, a regional climate model is employed to generate climate scenarios with high temporal and spatial resolutions over the Province of Ontario, Canada. A stepwise cluster analysis approach is developed as a surrogate of hydrologic models, to establish relationships between precipitation and runoff and to deal with the related uncertainties. A factorial probabilistic collocation method is then proposed; it is useful for uncertainty propagation within a reduced dimensional space, and can help explore interactions among various hydrologic parameters. Multivariate inference is then conducted to reveal statistical significance of multiple modeling terms in five dimensional second-order and third-order polynomial chaos expansions (PCEs). A set of truncated PCEs can thus be generated through discarding insignificant terms, leading to a remarkable reduction in computational efforts. The results reveal that the truncated PCEs are functional representations of the precipitation-runoff processes in terms of efficiency and accuracy. The performance of the third-order PCEs is better than the second-order ones based on a comparison with Monte Carlo simulation. Finally, the impacts of climate change on Ontario watersheds are analyzed based on climate projections as inputs of the surrogate models.
Keynote Speaker III

Prof. Wang Shuguang
School of Environment Science and Engineering, Shandong University, China

Prof. Wang is the Associate Dean of the School of Environment Science and Engineering at Shandong University, and the Director of the Shandong Key Laboratory of Water Pollution Control and Resource Reuse in China. Dr. Wang received his doctoral degree from the Ecological Research Center of Chinese Academy of Sciences in 2002. He has long-term been working in the fields of Water Environmental Informatics and has specially expertise in Water Pollution Control, Water Resources Management, and Impacts of Hydrological Variation on the Viability of Microbial Ecosystems. He was enrolled in the Ministry of Education New Century Outstanding Talent Program (in 2010). He has won over 10 research awards, such as the Shandong Outstanding Youth Science Fund (in 2011), the Middle-Aged and Young Experts with Outstanding Contributions (in 2015), the Science and Technology Award (in 2011 and 2015) as well as the Science and Technology Progress (in 2007, 2009 and 2010) in Shandong province. Dr. Wang has committed to many key research projects. He is in charge of four general programs supported by the National Natural Science Foundation of China (NSFC). He also undertakes one key program of the National Water Pollution Control and Treatment Science and Technology Major Project supported by Ministry of Science and Technology. He served for many times as the chief consultant expert and team leader of various crucial research projects. Besides, he is an outstanding and fruitful scholar who published 2 English books entitled “Heavy Metals in the Environment” and “Environmental Management”, 16 patents of invention, and nearly 100 peer-reviewed SCI journal papers (Science Citation Index), among which the total citations are over 2300.

Topic: “The fate and transfer mechanisms of antibiotic resistance genes during bio-electrochemical treatment of chloramphenicol wastewater”

Abstract: The consumption of antibiotics has contributed to continuous emissions of antibiotics into the environment and resulted in the spread of antibiotic resistance bacteria (ARB) and antibiotic resistance genes (ARGs), which could pose a threat to human health. Chloramphenicol (CAP) is a broad-spectrum antibiotic that has been widely used, but it can be carcinogenic and genotoxic for humans. The bioelectrochemical system (BES) is a promising approach for treating CAP wastewater. However, the fate and transfer mechanism of ARGs during the treatment of CAP wastewater in BES is still unclear. In this work, a BES reactor was developed for CAP removal and the CAP removal capability of BES was examined. The fate and transfer mechanism of ARGs in BES were determined. The results revealed that BES is a promising alternative for CAP wastewater treatment without enrichment of ARGs. The shift of microbial community, rather than horizontal gene transfer was the main transfer mechanism of ARGs under different salinities. Furthermore, the enrichment of anaerobic functional bacteria carrying ARGs contributed to the metabolic performance enhancement. This study provides new insights on the mechanisms underlying the alteration of ARGs in BES treating antibiotic wastewater.
Invited Speaker I

Prof. Anna WON
School of Architecture, Kyungpook National University, Republic of Korea

Prof. Anna WON received Ph.D Degree in Environment and Information Sciences, Yokohama National University, JAPAN in 2006. After vigorous working experiences in Environment and Information Sciences, Yokohama National University, JAPAN in 2009, and CRIEPI (Central Research Institute of Electric Power Industry), JAPAN in 2012, she is now a professor of Kyungpook National University, KOREA. Her current research interests are District Energy Sytem, HVAC, Utilization of renewable energy, Energy efficiency, Energy policy.


Abstract: Japan aimed for independent energy provision of large-scale energy consumers and energy efficient supply, so it actively introduced the District Energy System (DES) in the 1970s. A total of 133 sites (2 sites are unclear) are currently in operation, with 23 DESs established since 2000, and 110 sites consisting of superannuated facilities that are more than 20 years old. The purpose of this study is to compare and analyze the operational status of the DESs according to secular change, by identifying the supply area, the primary energy usage, and the utilization of renewable energy.

As of 2003, 164 sites were in operation, and as of 2015, there were 133 sites. About 83% of the 133 sites were obsolete, being – more than 20 years old. About 87% areas showed lowered ratios of input primary energy in 2015 compared to that in 2003.

The rate of operation of the main DES energy production system, cogeneration, has declined significantly, and the number of areas that use a current system rather than operate in cogeneration, has increased. This may have been due to the reduction of end use demand by the aging of the cities and the deterioration of the facilities. Therefore, it is necessary to suggest a new direction for the DES in preparation for the aging of their localities.
Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session. Please arrive at conference room 10 minutes before the session beginning to upload PPT into conference laptop.

Session 1
Afternoon, Sept 3, 2018 (Monday)
Time: 15:10~17:40
Venue: Information Centre Reporting Hall
Session 1: 10 presentations-Topic: “Workshop on Environment, Water and Energy”
Session Chair: Dr. Weidong Zhang and Ning Zhang

K0049 Presentation 1 (15:10~15:25)
Aquaculture wastewater treatment with immobilized microorganisms-aquatic plants strengthened purification system
Huiyan Cheng, Jiangxue Long, Z Liu
Xiamen University of Technology, China

Abstract: Combined purification system of microorganism-aquatic plants were established by adding immobilized 3.0×1010 CFU/ m3 EM (Effective Microorganisms) to Eichhornia crassipes and Pistia stratiotes, to study the purification effect on prawn aquaculture water. The results showed that the purification effect of 2 groups of immobilized microorganism - aquatic plants (SEE and SEP) on ammonia nitrogen (NH4+-N), total nitrogen (TN), total phosphorus (TP) and chemical oxygen consumption (COD) were significantly better than those of the immobilized microorganism SEM group (P<0.05). The degradation efficiency of SEE and SEP system to ammonia nitrogen were 98.37% and 96.22%. The degradation rate of TP were 90.28% and 86.11% respectively. The removal efficiency of COD were both close to 86%. At the same time, Eichhornia crassipes was slightly better than Pistia stratiotes in microorganism - aquatic plants system.

K3009 Presentation 2 (15:25~15:40)
Treatment of candied fruit wastewater by adsorption oxidation combined process
Mengxiang Zeng
Xiamen University of Technology, China

Abstract: In this experiment, we applied a combined process of adsorption and oxidation for the treatment of candied fruit production wastewater. The influence of the pH value and dosage of the Fenton reagent on the treatment effect were investigated. The impact of regeneration temperature, power, and time on the efficacy of the regeneration of adsorbents were examined by ultrasonic wave. The results revealed that at pH 4, the removal rate of COD was 81.74% at a dosage of FeSO4 7H2O of 7 g/L and 40 mL/L of H2O2. The maximum regeneration rate of the adsorbent 90.73%, reached at a temperature of 35 °C, ultrasonic power of 200 W, and 10 min duration of treatment.

K3032 Presentation 3 (15:40~15:55)
Research on the Cellulase Hydrolysis of Colocasia Antiquorum in Producing Ethyl Alcohol

Hui Zhi Yan, H Y Fu, G X Su, D Zhao, Y C Wu, J F Liu, P F Gao, Y T Huang

Xiamen University of Technology, China

Abstract- The cellulase hydrolysis during the ethyl alcohol is generated by colocasia antiquorum is investigated in the research. Adopting the single factor variable method, the researched selected three influencing factors (the amount of cellulase, hydrolysis temperature and hydrolysis time) to carry out enzymatic saccharification sugar production tests of pretreated colocasia antiquorums. The results demonstrate that the sugar yield amounts to the maximum (165mg/g) when the enzyme dosage is 0.04g/g, the enzymatic hydrolysis temperature is 45℃, and the reaction time is 48h.

K0025 Presentation 4 (15:55~16:10)

Study on thermal performance of a phase change thermal storage device by utilizing off-peak power

Bo Tang, Q H Shangguan and Y Lu
Southeast university, China

Abstract- Based on the background of peak load shifting, this paper proposes a phase change thermal storage device by utilizing off-peak power. Experimental investigations on its thermal performance is conducted, it shows that the regenerator has high density of thermal storage and good thermal storage efficiency of 91.3%. At the same time, numerical simulations of the heat transfer enhancement by using fins are performed on the exothermic process, the results show that the addition of fins can effectively improve the exothermic efficiency to 80%. The experimental and simulation results have some reference value for exploring the application of latent heat thermal storage in real life.

K0033 Presentation 5 (16:10~16:25)

The Profit Influence of Additional Heat Sources on Combined Heat and Power System in Existing Peak Shaving Compensation Mechanism

Y Bai, J X Qin, Qi Guo and Z K Yi
School of Electrical Engineering and Automation, Harbin Institute of Technology, China

Abstract- In combined heat and power system, configuring of electric boilers, heat storage and other additional heat sources (AHS) is an effective way to alleviate the problem of wind curtailment in northeast China. In this paper, according to the currently existing peak shaving compensation mechanism, a production simulation model with AHS has been established. Based on them, the impact of AHS on the profit of combined heat and power (CHP) units, conventional (CON) units and wind farms is analyzed. Simulation system derives from a city of Jilin province, northeast of China, simulation result shows that with AHS involved, wind farms benefit most, and CHP units face profit decline. Besides, this paper also gives some advice to promote the configuration and operation of AHS, which has a guiding significance for the improvement of peak shaving compensation mechanism.

K3036-a Presentation 6 (16:25~16:40)

Two attempts to optimize n-damo process through optimization of methane availability: static pressure and immobilization
Zhen Hu, Yinan Wang, Dongyun Ru  
School of Environmental Science and Engineering, Shandong University, Qingdao, Shandong, China

Abstract- Nitrite-dependent anaerobic methane oxidation (n-damo) process, conducted by n-damo bacteria, is energy efficient but limited by the low specific activity and low growth rate of n-damo bacteria. In this study, two attempts were conducted to optimize n-damo process through optimization of methane availability, i.e., increasing static pressure and immobilization with activated carbon. Four systems were conducted to investigate the effect of static pressure and immobilization with activated carbon on n-damo process: sludge under ambient static pressure (0.1MPa, S-ASP), sludge under high static pressure (0.3 MPa, S-HSP), immobilization particles with activated carbon under ambient static pressure (0.1MPa, I-ASP), immobilization particles with activated carbon under high static pressure (0.1MPa, I-HSP). Activity of n-damo bacteria was improved by 42.5% and 49.2% through both increasing static pressure and immobilization with activated carbon, respectively. The highest n-damo activity was obtained in I-HSP, which reached 47.7 μmol N L⁻¹ g⁻¹ h⁻¹. The abundance of n-damo bacteria in four systems followed the order of I-HSP > I-ASP > S-HSP > S-ASP, which was in consistence of the order of nitrite reduction rate in different reactors. And the highest abundance of n-damo bacteria reached 7.76 ×10¹⁰ copies g⁻¹ in I-HSP. Both abundance and activity of n-damo bacteria were higher than the currently reported data, which was mainly because the two attempts could enhance methane availability of the system. Biomass in S-HSP presented biggest specific surface area, which was conducive to transfer of substrate (such as methane) and n-damo bacteria. Furthermore, immobilization with activated carbon could significantly improve the methane adsorption and transfer of biomass in I-ASP and I-HSP, which resulted in better methane availability. In addition, n-damo bacteria in S-HSP and I-HSP presented higher richness and diversity in this study, demonstrating that increase of static pressure could facilitate n-damo bacteria growth.

K0067-a Presentation 7 (16:40~16:55)  
Sources attribution of atmospheric ammonia using stable hydrogen and nitrogen isotopes  
Yang ZENG, Jing LIU  
Shandong University, China

Abstract- The increasing growth of anthropogenic ammonia emission brings immeasurable impact on environment. Ammonia mitigation relies on the source apportionment of atmospheric ammonia and the accumulation of data from field measurement. This work aims to characterize the contribution of anthropogenic sources to atmospheric ammonia of urban and rural areas in China. Ammonia samples are collected from various sources of three categories. The source apportionment is based on stable hydrogen and nitrogen isotopic composition of ammonia (δD-NH₃ and δ¹⁵N-NH₃) and stable isotopes mixing model (IsoSource). The result will provide valuable information to the prediction of atmospheric ammonia concentration. It will contribute to improve the ammonia emission inventory and formulate an ammonia mitigation plan.

K0068-a Presentation 8 (16:55~17:10)
Invsetigation of fate and behavior of tetracycline in nitrifying sludge system

Chao Song, Xue-Fei Sun, Peng-Fei Xia, Yun-Kun Wang, Shu-Guang Wang
School of Environmental Science and Engineering, Shandong University

Abstract- This study aims to investigate the fate and behavior of tetracycline (TC) in nitrifying sludge system, as well as the effects of TC dosage on sludge performance. For this purpose, two TC spiked and two control laboratory reactors were operated for two months, while the spiked reactors (designated as RI and RII) were intermittently fed with TC at the concentrations of 10 and 1 mg/L, respectively. TC could be effectively removed via initial adsorption and subsequent biodegradation, while biodegradation was the primary mechanism in this study. Compared to RII, no significant negative effects were found on dehydrogenase activity under higher TC stress in RI. It is interesting that RI showed better nitrification performance than RII, especially higher nitrite oxidation capacity. Moreover, exposure to TC also promoted the formation of aggregation and affected the composition of nitrifying bacteria. The relative contents of nitrite-oxidizing bacteria (NOB) in RII decreased by almost 50%, from 24.8 ± 6.9% to 12.8 ± 5.0% while it was slight change in RI, from 23.6 ± 8.2% to 20.3 ± 6.9%. Furthermore, the mean sludge diameter increased from 218.3 ± 7.8 μm to 512.4 ± 7.8 μm and 353.8 ± 11.1 μm in RI and RII, respectively. It indicated that larger aggregations were discovered in reactors with high TC stress. The aggregation might lead to multilayer structure of sludge to protect microorganism inside, which would explain the higher relative abundance of NOB in reactors with high TC stress. This work expands our vision about the fate and behavior of antibiotics in activated sludge system, which has far-reaching implications in activated sludge process.

K0069-a Presentation 9 (17:10~17:25)

Bioaerosol Transformations across an Air-Conditioning Cooling Coil

Yan Wu, Jiahui Rong and William W Nazaroff
School of Environmental Science and Engineering, Shandong University, Qingdao 266237, China

Abstract- This study is concerned with the role of a fin-and-tube heat exchanger in modifying microbial indoor air quality. The objective of this research is to provide a systematic experimental investigation of bioaerosol transformations across a typical fin-and-tube heat exchanger in a model vapor-compression ACMV system similar to those used in modern air-conditioned buildings in tropical environments. In brief, the factors affecting microbial aerosols deposition will be revealed and the spatial distribution of microbial aerosols on the heat exchanger will be measured for dry (not cooled) and wet (cooled) coils. Based on the spatial distribution, the types and concentrations of pollutants generated by deposited microbial particles inside the heat changer system would be also analyzed using a Qubit fluorometer, a quantitative PCR system and a microplate reader. Finally, the mechanism of generation, release and diffusion of secondary pollutants would be revealed through the combination of experimental data and model prediction. Moreover, health risks associated with secondary pollution will be also evaluated by combining cell toxicology testing in vitro and aerosol inhalation exposure experiment. This study contributes to a better understanding of bioaerosol transformation processes as pertinent influences of indoor air quality in
Modeling Method for the Initial Speed Degradation of a certain Type of Machine Gun Barrel
Yonghai Shan, Xianming Gao, Cheng Xu
China Baicheng Ordnance Test Center, China

Abstract—In order to study the shooting life and variation law of machine gun barrel under different test stresses, based on the generalized regression neural network method optimized by the fruit fly optimization algorithm and combined with the test data of machine gun acceleration life, a model of initial speed degradation of machine gun barrel was established under the combined stress of different amount of fired bullet during a cooling cycle, different test environmental temperature and different interval time of changing bullet boxes. The accuracy of barrel life and initial speed prediction can be over 90% by simulation test and error analysis. It can be used to predict the life of machine gun barrel and improve the precision of barrel life prediction.
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Session 2

Morning, Sept 4, 2018 (Tuesday)
Time: 10:30~12:00
Venue: Information Centre Reporting Hall
Session Chair: Prof. Haiyan Fu

K4001 Presentation 1 (10:30~10:45)
SDN-based Management Framework for IoT
Chin-Shiuh Shieh, Jhih-Ying Yan, and Hao-Xiang Gu
National Kaohsiung University of Science and Technology, Taiwan

Abstract- Internet of Things (IoT) is getting more and more popular. This trend brings about great challenge in system management for administrators. A framework featuring Software-Defined Networking (SDN) and Message Queuing Telemetry Transport (MQTT) is proposed in this study to facilitate the deployment and management of IoT. With the proposed framework, the network connectivity and routing of a newly added node can be automatically configured. The functionalities, including data acquisition and device configuration, of an individual end device can be remotely managed via friendly web-based user interface. Flexibility in deployment, sophistication in management and failover of faulty route can be achieved with the proposed framework.

K4002 Presentation 2 (10:45~11:00)
Traffic Accident Time Series Prediction Model Based on Combination of ARIMA and BP and SVM
Xiaorui Shao
Pukyong national university, Korea

Abstract- In this paper, constructs a time series combination forecasting model by using the reciprocal variance method based on the time series models ARIMA. Using the constructed combination model to predict traffic events related index. Firstly, ARIMA and BP, ARIMA and SVM are established. Through comparing, The SVM model is better than BP neural network, So, establish the ARIMA(2,2,2) and SVM combination model. Also establish the ARIMA(2,2,2) and SVM, BP neural network combination model. The experimental results show that the we can improve the accuracy of predicting traffic events related index time series through combination model generally. The ARIMA(2,2,2) and SVM, BP neural network combination model is more accurate than each of single model, also than ARIMA(2,2,2) and SVM combination model. We can adopt ARIMA and SVM, BP neural network to predict traffic events index accurately.
K4005 Presentation 3 (11:00~11:15)
A Study on Customers’ Sentiment analysis Based on Big Data Using Twitter Data
Xiaorui Shao
Pukyong national university, Korea

Abstract-This paper focus on mining the value of customers emotional behavior using Twitter data. Use Apache Flume to collect tweets data from Twitter. 192,390 tweets are being collected, and then the natural language processing (NLP) technology has been used to divide and filter tweets for customers’ emotional behaviors analysis. We picked 5 main hot topics among these tweets. Choose one of the hot topic HUAWEI honor 9 for sentiment analysis (SA). Through comparing with Naive Bayes, Maximum Entropy Classifier, Decision Tree Classifier is the most effective classification method for our data sets. According to our experiment, the result show that 45% of customers satisfied with HUAWEI honor 9, but there is still having 36% of customers unsatisfied with it. Specially, in the filed of battery, game and stand-by power consumption, it needs a great of improvement.

K3001 Presentation 4 (11:15~11:30)
Micro-weather station system for small geographical coverage in the Philippines
RODRIGO C. MUÑOZ, JR, X S Yumang, S J A Japitana, K R C Medina and J E T Tibayan
BATAAN PENINSULA STATE UNIVERSITY, PHILIPPINES

Abstract- Drastic changes in the climate occur globally, and here in the Philippines, typhoons and storms are experienced all year round. According to the state weather bureau PAGASA, the Philippines visited by at least 8 to 9 tropical cyclones every year and more than million worth of crops and properties are being destroyed. To reduce the risk and danger due to extreme rainfall and strong winds caused by these disasters, early warning broadcast is necessary. In this article an Arduino-based weather data acquisition device was designed, tested, and installed. It measures temperature, relative humidity, and amount of rainfall to serve as a baseline data for studying the trend and its relationships on the occurrence of natural calamities to small geographical coverage in the Philippines. This also served as a warning system and source of information in the studies of weather patterns in the specific areas. It stored actual measurement of rainfall, temperature, and humidity to the database that can be printed or downloaded from the web page. The device alarmed the locals for incoming flood using GSM communications network. Test results revealed that the system gave an accuracy of 96.28%, with an efficiency of 97.06%, and effectiveness of 99.95%. The calculated Overall Equipment Effectiveness (OEE) of the whole device is 93.4%.

K3011 Presentation 5 (11:30~11:45)
Influence Oil Price towards Economic Indicators in Russia
Anthony Nyangarika
School of Management and Economics, Beijing Institute of Technology, China

Abstract- This paper proposes the effect of oil price shocks on the Russian economic indicators using time series for the period 1991-2016 year to cover all of oil price shocks. The vector autoregressive and the Dickey-Fuller test were utilized to investigate the long-run and the short-run relationships between variables. From the results shows that one of the most important external impact factor is the world price of oil. This research work suggests a positive and significant long-term relationship between oil prices and Russian GDP dynamics.
K5006 Presentation 6 (11:45~12:00)
Study on Structural Characteristics and Evolution of China Regional Investment Network
Xiaohong Chang, and Lihong Chang
Beijing University of Agriculture, Beijing, China.

Abstract- This paper collected the data of listed companies and its largest shareholders in Shanghai Stock Exchange and Shenzhen Stock Exchange 300 Index from 2007 to 2013. The listed companies are divided by their locations at provincial level. In this paper the regional investment network is identified by the rationale and specification content, and analyzed the structure feature of China's regional investment network and its evolution based on the complex network theory. The results of our study indicate that China's regional investment network function is gradually improving, and the network connection is complete. Geographical adjacent provinces have more contact and easy to form subgroup after competition and recombination. Contact densities keep increasing both in subgroup and inter subgroup, but provinces contact in subgroup is more than inter subgroup. The polarization effect of regional spatial pattern is gradually weakened, the contact density decreases in the core area, the contact density of edge area inside, edge area and core area is gradually increasing, so the regional investment is developing coordinated and balanced.

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session. Please arrive at conference room 10 minutes before the session beginning to upload PPT into conference laptop.

Session 3
Afternoon, Sept 4, 2018 (Tuesday)
Time: 13:00~15:15
Venue: Information Centre Reporting Hall
Session 3: 9 presentations-Topic: “Wind power generation and control”
Session Chair: Prof. Jassada Sarasook

K0008 Presentation 1 (13:00~13:15)
Research on Short-term Prediction Method of Substation Bus-bar’s Voltage Trend Based on Multidimensional Time Series Data Mining
Fei Xiao, Xiwu Leng, Kang Ye, Youlin Hu, Xiongli Li, Licheng Zhu
Tellhow Software Co. Ltd., China

Abstract- The short-term prediction of voltage trend is the important technical foundation of the voltage exceeding intelligent alarm system in power substation. According to correlation between the adjacent lines in the same substation, the time series data of different bus-bars in same section, was constructed into a multi-dimensional time series data matrix model for prediction of voltage trend. Moreover, based on above matrix model, a novel prediction method based on multidimensional time series data was proposed, which transformed the
multidimensional time series data matrix into a classical two-dimensional decision information system in the first stage via preprocessing and clustering. In the second stage, various classical machine learning algorithms are assembled to forecast the short-term future trend of the specific bus-bars’ voltages. The efficiency of the prediction method based on multi-dimensional time series data mining was validated by the implement in a 500 KV bus-bar’s prediction in a Substation of the State Grid Shanghai Company. The results represented that the prediction method in this paper had sound precision in practice and can improve the functionality of voltage exceeding intelligent alarm system via assistance to filter plenty of fake alarms.

K0026 Presentation 2 (13:15~13:30)

Design of Rated Power Control Strategy of Wind Turbine Based on Particle Swarm Optimization

Yongchang Yang, Y Liu, P Song, Y Cui, and Y Bai
North China Electric Power Research Institute Co., Ltd., Smart Grid and New Energy Institute, China

Abstract- In view of the reduction of wind turbine operating efficiency caused by wind speed measurement errors, this paper proposes a rated power control strategy for wind turbines for practical applications; in order to solve the problem that the pitch PI controller parameters of wind turbines are not easy to calculate and tune in the process of design and optimization, this paper proposes a complete set of methods for parameter tuning of pitch control PI controllers for wind turbines. This paper establishes a Bladed-Matlab co-simulation platform, uses Bladed software to build a complete model of a 2MW wind turbine, and designs a rated power control strategy for wind turbines. After the wind turbine model is linearized at different wind speed points by applying Bladed software, the linearized model for PI parameter tuning is obtained, and then the optimal PI parameters for each wind speed point are set by using particle swarm algorithm. According to the variation law between the PI parameters and the pitch angle obtained before, the PI parameters are adjusted adaptively by variable gain PI control. The simulation results show the superiority of the control strategy and parameter tuning method used in this paper.

K0028 Presentation 3 (13:30~13:45)

Impact of wind generators number and location on the resonance risk of wind farm integration through flexible HVDC system

Xiao Wang, Xiaobao Hu, Hui Liu, Linlin Wu and Siqing Sheng
North China Electric Power University, China

Abstract- Resonances or instability phenomena may occur in wind farms integration through a flexible HVDC transmission system. The relationship between the resonance risk and wind turbines number under different lengths of the line from wind farms to the flexible HVDC converter station is studied in this paper. First, the effect of the line length on the impedance characteristics of interconnected system is analyzed, and the aggregated RLC circuit approach is applied for the quantitative assessment of potential resonance risk. Then, the variation trend of system impedance characteristics caused by different wind turbines number is revealed, and resonance risk affected by the number of wind turbines integrated from the different location is evaluated by calculating system resonance damping around the resonant frequency. Finally, the simulation results on the RT-LAB platform validate the theoretical analysis.
K0037 Presentation 4 (13:45~14:00)

Suppression Methods for Low Frequency Oscillation of Wind Farm Considering SVG Minimum Output Dead Zone

Yangfan Zhang, Xu Xie, Peng Song, Hui Liu, Tao He

Grid Jibei Electric Power Co.Ltd. Research Institute, North China Electric Power Research Institute Co. Ltd, China

Abstract- At present, the research of Static Var Generator (SVG) mainly focuses on the main circuit topology, the optimization of control strategy, the method of selection, and lack of research on the low frequency oscillation of the wind farm caused by SVG minimum reactive output dead zone in practical engineering applications. For this reason, this paper first studies the mechanism of the low frequency oscillation of the wind electric field induced by the SVG minimum output dead zone of the wind farm, and discusses the conditions of this type of oscillation. On this basis, the automatic voltage control system (AVC) optimization model of wind farm is established with the minimum reactive variation of SVG output near the zero point as the optimization goal, and an optimization control strategy of wind farm with SVG minimum output reactive dead zone is proposed. Finally, the correctness of the result is verified by simulation. The results show that, due to the existence of the minimum output dead zone in the wind farm, the large reactive step may occur near the zero point of the SVG output, which causes the voltage low frequency oscillation of the wind farm. The optimization strategy proposed in this paper can significantly suppress the low frequency oscillation by coordinating and optimizing reactive power output near the zero point of multiple SVGs in wind farm.

K0039 Presentation 5 (14:00~14:15)


Maxime Binama, Wei-Hua Cai, Wen-Tao Su, Feng-Chen Li, Xian-Zhu Wei, Alexis Muhirwa

Harbin Institute of Technology (HIT), China

Abstract- Pumped storage power plants are now honored for different novelties mostly to do with large energy storage ability and electrical grid stabilization capacity. However the control of Reversible pump Turbines (RPT) operations within these plants is still an issue, where the so-called S-shape flow instabilities cause different problems especially when under low discharge operating conditions. Taking from the grounds that these instabilities have been found to mostly be based within the vaneless space between the guide vanes and the runner, this paper intends to investigate the effect of guide vanes opening (GVO) on runner flow characteristics. CFD-backed numerical simulations were carried out on a RPT complete flow passage under different GVOs; namely 17mm, 21mm and 25mm openings. Instabilities were found to take source from low flow conditions where resulting hydraulic losses maybe the trigger of s-shape characteristics appearance. The GVO however, showed the ability to tame the severity of these flow instabilities and associated pressure pulsations.

K1006 Presentation 6 (14:15~14:30)

Research on reduced scene sets based on ARMA model of wind farms day-ahead total output forecasting
**Hui chao WANG, Lei LIU, Jin hui MA, Jie DING and Chang ZHOU**  
China Electric Power Research Institute, China

**Abstract** - In this paper, the ARMA model is used to linearly fit the time series data of wind farms’ prediction error with the software E-views. And then the error linear curve is sampled by four sampling methods, including random sampling, important sampling method, Latin hypercube sampling method and quasi-Monte Carlo method, to obtain some Ascending and disorderly samples respectively. Finally, the reduced scene sets are obtained by substituting the samples into the scene reduction model. Through analysing the reduced scenes output curve with the evaluation indicators of wind farms’ forecast output curve, we find that the reduced scenarios are closer to the actual output curve than the traditional predicted. It also can be concluded that they have great effect on prediction correction and sampling methods have little effect on the output trend of reduced scenarios. Whereas, comparing the reduced scenes’ output curve before and after sorting the sample data, the disorder and randomness of the sample data will lead to great volatility in the reduced scenes.

**K1008 Presentation 7 (14:30~14:45)**  
Rotation Speed Recovery Strategy Based On Variable Power Curve of Inertia Control from DFIG Wind Turbine  
**Rui Liu, P Song, X S Wang and Z W Lin**  
State Grid Jibe Electric Power Research Institute, North China Electric Power Research Institute Co. Ltd. China

**Abstract** - With the increase of wind power capacity incorporated into the grid, the permeability of wind power increases continuously, which leads to the reduction of the equivalent inertia of the system. A new strategy of recovering rotor speed that increases the output power by modifying the variable power curve is proposed in this paper, which decreases the drop of the active power. So as to reduce the secondary frequency dips caused by the sudden drop of the active power when the speed restores. The paper optimizes the secondary frequency dips by modifying the variable power curve continuously. This article simulates this strategy through setting up a system by Simulink. Compared with the traditional recovery strategy, validity of the proposed strategy is demonstrated through simulation and analysis.

**K1010 Presentation 8 (14:45~15:00)**  
Review on Target Tracking of Wind Power and Energy Storage Combined Generation System  
**Xuewei Guo, Man Xu, Linlin Wu, Hui Liu and Siqing Sheng**  
North China Electric Power University, China

**Abstract** - The utilization of large-scale renewable energy resources can effectively alleviate the shortage of traditional fossil fuel energy resources and the problem of environmental pollution. In order to realize the grid-friendly access of renewable energy power generation represented by wind power, it is necessary to involve energy storage, of which the battery energy storage is the most widely used type, and build a relatively controllable combined power generation system. Target tracking is one of the demand that wind power and energy storage combined generation system is supposed to meet. According to the discrepancies in tracking target, this paper firstly categorizes the target tracking issue into three parts, namely tracking wind power forecasting curve, tracking generation plan and tracking dynamic power generation index. Then based on the categories and considering their own research focuses,
relevant literatures are summarized and compared. Conclusions and future research points are provided in the end. It is found that the issue of tracking dynamic power generation index worth more attention attributed to its novelty and complexity, where future work may be conducted from two aspects, the mathematical model dynamic power generation index and control strategy with overall management ability.

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<tr>
<th>K3026 Presentation 9 (15:00~15:15)</th>
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<tbody>
<tr>
<td>Method on Condition Assessment of Pitch System based on Fuzzy Matter-element Analysis</td>
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<tr>
<td>Zhao Shuangxi, Zhang Lei, Hou Lijun, <strong>Xiao Cheng</strong> and Zhu Xipan</td>
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<td>Hebei University of Technology, China</td>
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Abstract- In order to improve the real-time reliability of wind turbine and to solve the effect of artificial factors, fuzzy matter-element analysis is proposed. The pitch system, which has high failure rate, is researched in this paper. The condition assessment model of pitch system is built in two steps: (1) To avoid the subjective judgment of the parameter distribution, this thesis uses 3σ rule and quartile analysis method to get the boundary data sets. The ANFIS algorithm is used to train the data to reduce the extreme value, and results of multi-feature fault detection are obtained. (2) Results from fault detection are applied in condition assessment model based on fuzzy matter-element analysis to realize the unification of fuzzy value of detection result and grade assessment. The method is applied to test the actual operation state of wind turbine. The results show that compared with the traditional two-element method, it can obviously reflect the pitch system, and has better assessment effects. From the qualitative point of view, this method is more advantageous than the fuzzy comprehensive evaluation method and the traditional matter-element analysis method in the condition assessment of the pitch system.

**Tips:** The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session. Please arrive at conference room 10 minutes before the session beginning to upload PPT into conference laptop.

**Session 4**

Afternoon, Sept 4, 2018 (Tuesday)  
Time: 13:00~15:30  
Venue: Administration building 301  
Session 4: 10 presentations-Topic: “High voltage technology and fault diagnosis”  
Session Chair: Prof. Rodrigo Munoz and Jiangxue Long

<table>
<thead>
<tr>
<th>K0017 Presentation 1 (13:00~13:15)</th>
</tr>
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<tbody>
<tr>
<td>Improved Control Strategy for AC-Filters Switching in UHVDC Converter Station</td>
</tr>
<tr>
<td><strong>LI Hui</strong>, WANG Xiaofei, YU Bin, LIU Haifeng, XU Hao, GUO Siyuan</td>
</tr>
<tr>
<td>State Grid Hunan Electric Power Corporation Limited Research Institute, China</td>
</tr>
</tbody>
</table>

Abstract- The AC-filter configuration, reactive power consumption, reactive power control function, switching and replacement strategy in SHANSHAN UHVDC converter station are
The various types of AC filters in the converter station are evenly configured in the large groups of filters based on their quantity. And the related types of filters within a large group are usually switched preferentially. The problem of this switching strategy that may cause large impact on the AC system and long reactive power recovery time during the large group of AC filter bus lines fault are analyzed. Then an improved strategy that the needed filters with same type are equally switched on the large AC-filter group is proposed. The proposed strategy can effectively reduce the influences of AC-filter bus fault to the AC system which will give some references for the design and operation of subsequent UHVDC projects.

**K0021 Presentation 2 (13:15~13:30)**

Researches on Two Kinds of Fault Restart Logic of Qishao ± 800 kV UHVDC Project
**Hao Xu, Lei Zhang, Haifeng LIU, Wenwu LIANG, Hui LI**
State Grid Hunan Electric Power Limited Corporation Research Institute, China

*Abstract*- In order to improve the availability and operating efficiency of the DC system, Qishao ± 800kV UHVDC transmission project pole layer control system is equipped with two kinds of fault restart logic, namely the instantaneous fault restart and the valve group fault restart. In this paper, the triggering mechanism, timing and opening conditions of these two fault restart logic are analyzed in detail, and the relationship between the instantaneous fault restart logic and other protections reacting transient faults in pole and bipolar zone is studied emphatically, DC system debugging scene recorded wave diagram is referred to illustrate the two restart logic of the action process and effect, with a view to provide some guidance and reference significance to the field operation and research work.

**K0048 Presentation 3 (13:30~13:45)**

Study on Influence Factors of Lightning Impulse Test Waveform of UHV GIS Equipment
**Jiadong Meng, Tianxiang Chen, Dajin Chen, Rongquan Wang and Lei Wang**
Xiamen University of Technology, China

*Abstract*- The lightning impulse withstand voltage test is a test item that must be carried out for type testing, factory test or even field test of electrical equipment such as gas insulated metal-enclosed switchgear (GIS). However, the factors affecting the lightning impulse test waveform are complex and diverse. In this paper, the discharge principle of the impulse voltage generator is studied. Combined with simulation, the influence of different factors on the waveform parameters of lightning impulse test of UHV GIS equipment is obtained. The common methods and improvement measures of waveform debugging are pointed out, and the main factors affecting the parameters of lightning waves are studied.

**K0050 Presentation 4 (13:45~14:00)**

Electric Field Analysis on Buffer Layer of HV XLPE Power Cable by Finite Element Method
**Weiwei Zhang, Youxiang Yan, Weiling Lin, Shanshan Li and Lei Wang**
Xiamen University of Technology, China

*Abstract*- In recent years, white defects in power cable buffer layer has been discovered many times around the world. It would be a hazard to electricity transmission if these defects are not detected and solved in time, finally resulting in a power outage. In this paper, the selection of a physics field and the building of a three-dimensional model on cable electric field simulation are mentioned and improved. The distribution of electric field was calculated with
two factors: the gap between water-blocking tape and aluminum sheath, the conductivity of water-blocking tape. The results demonstrated that the existence of the gap increases the electric field intensity in the air layer. Increasing the conductivity of water-blocking tape is beneficial to reduce the electric field intensity. It was explained that white defects is closely related to the air discharge in buffer layer.

**K1009 Presentation 5 (14:00~14:15)**

Study on the Subsynchronous Resonance Control Method Based on the DFIG Grid-Side Converter  
**Meng Xue Yin, H Liu, Y H Li and W Song**  
North China Electric Power University, China

*Abstract-* DFIG-based series-compensated can increase the capacity of wind power transmission, but it can also cause the sub-synchronous resonance (SSR) problem. Based on the mechanism of subsynchronous resonance in DFIG, the electromagnetic torque variation under the variation of rotor speed can be divided into two parts, i.e. rotor torque variation and stator torque variation. Supplementary controller is added to the stator side converter, which is generated to provide positive damping. MATLAB simulation is carried out to compare the result of supplementary damping. Results show that supplementary damping controller makes DFIG keep stable under various rotor speeds and RSC inner-loop gain.

**K0006 Presentation 6 (14:15~14:30)**

Fault Diagnosis of Gas Turbine Based on Improved BP Neural Network with the Combination of N-W and L-M Algorithm  
**Zhang Yun, Qian Yu-liang, Qiu Zheng and Zhang Xiao**  
Shanghai University of Electric Power, China

*Abstract-* In order to solve the problem that the training speed of traditional BP neural network is slow in the process of gas turbine fault diagnosis, a new fault diagnosis method based on a combination of Nguyen-Widrow method and L-M optimized BP algorithm was proposed. The Nguyen-Widrow method is used to initialize the weights and thresholds of neurons in the BP neural network, and the L-M algorithm is used to improve the search space of the BP neural network, which reduces the times of network training and accelerates the learning speed of the network. The gradient descent method, the conjugate gradient method and the N-W and L-M combination optimization methods are respectively applied to the fault diagnosis of gas turbine. The results show that the BP neural network model optimized by combining N-W and L-M has faster learning speed and higher diagnostic efficiency for gas turbine fault diagnosis.

**K0024 Presentation 7 (14:30~14:45)**

Research and verification of setting value coordination method considering the responding deviation of under excitation limit and loss of excitation protection for generator  
**Quan HONG, Li LI, Haifeng LIU, Wenqi MAO, Wenjun LU**  
State Grid Hunan Electric Power Co. Ltd. Power Research Institute, China

*Abstract-* The general principle of the matching between the under excitation limit and the loss of excitation protection has been extensively described, which mostly concentrated on the theory and method of converting them to the same power plane or impedance plane for verifying, but there is little literature of considering the influence of the action characteristics.
of the field device to the matching results for the setting value. In theory, the influence of parameter variation to the matching result is analyzed in detail. This paper proposed the matching testify principle based on the application operation deviation and expounds the adjustment method of setting value mismatch, which provides an effective guidance principle for power plants with verification and cooperation of under excitation limit and loss of excitation protection.

**K1007 Presentation 8 (14:45~15:00)**

Grounding Fault Analysis and Protection Measures Study of Composite Grounding Arc-suppression Modes

*B Yu, H Li, W J Zhu, H F Liu, W W Liang, Z D Zhang, S Y Guo*

State Grid Hunan Electric Power Company Limited Research Institute, China

**Abstract** - Centering on analysis of single-phase ground fault, and based on a wide-range survey of typical structure and accessing equipment of 10kV distribution network, accurate simulation model reflecting engineering practice is established according to the existing power design standards. For composite grounding arc-suppression modes, this paper describes both the principle and fault treatment process of grounding fault transfer mode and intelligent multimode grounding mode. According to the fault treatment process, a line selection method based on the first transient half wave of fault grounding and operation grounding of the own line is put forward for grounding fault transfer mode, and the effect of transition resistance on zero-sequence current protection for intelligent multimode grounding mode is analyzed. All of this is verified by our simulation model in PSCAD. This research lays a solid theoretical foundation for the engineering application of composite grounding arc-suppression mode.

**K3020 Presentation 9 (15:00~15:15)**

Improvement of performance calculation methods for pulverized coal and blast-furnace gas co-fired boilers

**Yalan Ye, Hongming Wang, Xiang An, Wenhao Jiang**

Jiangsu Maritime Institute, China

**Abstract** - In power plants of steel mills, the performance of pulverized coal and blast-furnace gas co-fired boilers was tested according to GB/T10184-2015 "Performance test code of utility boiler". However, the calculation and analysis models in this code are mainly based on conventional fuels. Besides, the special properties of blast furnace gas were not taken into account. Therefore, the code GB/T10184-2015 is not suitable to be directly used for pulverized coal and blast furnace gas co-fired boilers. According to the differences between co-fired boilers and conventional boilers, the key points for calculating the performance of co-fired boilers were analyzed on the basis of GB/T10184-2015, and the corresponding improved methods were proposed, in view of fuel composition conversion, combustion calculation, coal feed rate, exhaust gas temperature value, and pollutant emission concentration conversion. The results can provide reference for the performance test of such boilers, with certain practical significance.

**K3021 Presentation 10 (15:15~15:30)**

Research on Intelligent Diagnosis Strategy of Secondary Device Abnormity in Smart Substation

**Meizi Hong, Peng Li, Di Wu, Bo Wen, Hengxuan Li**
Abstract—With the high integration of smart substations, the traditional secondary cable in the conventional substation, which is unable to carry out online monitoring, has been replaced by the fiber-optic network with online monitoring function. The operation and maintenance personnel conduct the status of the secondary circuit through the communication messages in the network message analyzer. However, the rapid growth of information result in a series of issues, for example information is not intuitive and coverage of important information. As the consequence, it is difficult to quickly find the location and cause of fault. For the issue of abnormal diagnosis of secondary equipment of intelligent substation, this paper studies the operation and maintenance mode and physical modelling of the secondary system, visualization technology, on-line state evaluation technology and the fault location technology. On this basis, an intelligent diagnosis strategy for the secondary device of the smart substation is put forward. Furthermore, a fault diagnosis platform is developed to implement real time monitoring of secondary circuit and analyze abnormal situation to ensure the safe and reliable operation of smart substation.

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session. Please arrive at conference room 10 minutes before the session beginning to upload PPT into conference laptop.

Session 5

Afternoon, Sept 4, 2018 (Tuesday)
Time: 13:00~14:45
Venue: Administration building 501
Session 5: 7 presentations-Topic: “Electronic information technology and application”
Session Chair: Prof. Jianhua Yang and Zhen Hu

K4006 Presentation 1 (13:00~13:15)
Effect of Different Reductants on Leaching Lithium and Cobalt from Lithium Ion Batteries in Tartaric Acid Solution
Qian Cheng
Xiamen University of Technology, China

Abstract—The cathode active materials of spent lithium ion batteries contain significant amounts of lithium and cobalt, which is worthy of recycling. The cathode active materials were employed as raw materials. The effect of reduction on the leaching efficiency of Li+ and Co2+ was compared among glucose, ascorbic acid and hydrogen peroxide with tartaric acid as the acid leaching solution. The results show all three reducing agents can convert the Co3+ of the cathode active materials to soluble Co2+. The complex of Co(III) can also be found during the reduction process. All three reductants can promote the leaching efficiency of Co2+, while having a marginal effect on the leaching efficiency of Li+. The maximum leaching efficiency of Co2+ is 36.94% for 20 g/L glucose, 47.22% for ascorbic acid, and 69.66% for 15% hydrogen peroxide, respectively. Among the three, hydrogen peroxide exhibits the best reduction effect.
### K0016 Presentation 2 (13:15~13:30)

Routing Architecture of Software Defined Energy Internet  
Dilin Mao, Xiu Cao, Xinyang Han, Chengzhi Zhu and Wei Geng  
Fudan University, China

**Abstract** - Energy Internet is a new and constantly evolving technology, of which the most critical part is how the energy flows. The concept of software customization used in the field of information will decouple the control plane from the data plane. It adopts a logical centralized control model. The control part of the device is implemented by a centralized programmable controller. Referring to the basic concept of computer network, the energy internet can be divided into energy resource subnet and energy transmission subnet. Energy micro-network, wide area energy internet and global energy internet are introduced. The concept of software-defined is applied to the field of smart grid which is the foundation and critical part of energy internet. This paper describes a software defined wide area energy internet routing architecture and implementation approach, which not only takes into account the compatibility of power devices with smart grid standards such as IEC61850 but also provides flexible software defined innovative application deployment.

### K3012 Presentation 3 (13:30~13:45)

Space Vector Flux Weakening Control of PMSM Drivers  
Gentao Dong, Jianfei Yang, Xin Qiu, Xun Liu and Cao Wei  
Nanjing Normal University, China

**Abstract** - Permanent Magnet Synchronous Motor is widely used in industry, medicine and other fields. Based on the mathematical model of permanent magnet synchronous motor (PMSM), a system of modeling and simulation of PMSM was constructed by MATLAB/Simulink, and two PI controllers were used in the speed loop and current loop. This paper presents the principle of pulse width modulation based on voltage space vector, and the simulation model of PMSM control system based on SVPWM is built in MATLAB/Simulink. In the end, some experiments are carried out to the whole system, and it proves that the system is of good performance both in steady and dynamic state.

### K3031 Presentation 4 (13:45~14:00)

IPv6-based ECG Monitoring System  
Jianqiang HU, Wei Liang, Gang Wu and Jiahao He  
Xiamen University of Technology, China

**Abstract** - The new generation healthcare monitoring system combines the technologies of WBSN (Wireless Body Sensor Network), cloud computing and Big data, and there are still limitations in protocol security and network latency. In response to the above situation, an IPv6-based ECG monitoring system was designed. This system is composite of body-sensing module, fog layer and cloud layer. The body-sensing module measures ECG signals, and fog computing node in fog layer collects the information and sends it to cloud computing node in cloud layer. Mobile intelligent device connects fog computing node and help individuals to know about ECG health. The proposed system uses advanced techniques such as IPv6-based network architecture, QRS complex detection based on wavelet transforms with average absolute difference threshold, and intelligent alarm model based on subband analysis algorithm. In order to determine the validity of the system, ECG data of 245 patients was
systematically generated for 30 days. Results depict that the proposed intelligent alarm model can distinguish ECG diseases effectively. Moreover, response latency is much lower than IPv4-based and cloud-assisted environment.

K3033 Presentation 5 (14:00~14:15)

Application of point cloud data in the construction and management of interior design

Minyong Li and Jianwen Liu
College of art and architecture, Xiamen Xingcai Vocational &Technical, College, Xiamen, China

Abstract- There are many defects in the construction and management of the previous interior design, which leads to the problems of inaccuracy, waste of materials, high labor cost and low efficiency in the actual construction and management. The application of three-dimensional scanning technology with high precision and high rate of point cloud data in construction and management of interior design is put forward. Through the three-dimensional laser scanning of the building body, the vector set of the building body in the set of three-dimensional coordinate system is obtained, and the data collected by the methods of multi frame data fusion and noise reduction are used to collect the data from the point cloud. Through processing, accurate indoor information data can be obtained and analyzed, and the foreseeable problems can be solved ahead of schedule. The extraction of indoor scene information by point cloud data improves the efficiency, accuracy and labor cost of the previous data collection, and improves the efficiency of construction and the ability to solve the problem.

K3034 Presentation 6 (14:15~14:30)

The Application Research of Oblique Photogrammetry Technology in Road Planning

Zhihuang Zheng
Fujian jingwei surveying and mapping information company, China

Abstract- This paper takes the planning and application of Ann Nine Railway as the demand, and adopt the multi-angle data information of the roads acquired by the oblique photogrammetry technology of UAV to realize the model reconstruction based on the Context Capture software. Then outputting data in kinds of formats to analyze. And based on Acute3D and LocaSpace to perform the viewing and measurement of the real 3D model, the model is repaired based on the Geomagic. The measurement and spatial analysis application of the 3D model based on LocaSpace. The application results show that the real 3D model was built could be applied to the railway planing based on the oblique photogrammetric data. And the measurement results can be used for various types of measurement and spatial analysis, which can provide the reference value of important data support for railway planning and design management, decision-making and construction operations and so on.

K3035 Presentation 7 (14:30~14:45)

Research on LED Advertising Display Wireless Control System Based on MT6589

Yizhou Mao, Yingchao Xu, Subin Wang, Weiping Zhu
Xiamen University of Technology, China

Abstract. Aiming at the problems of wired control and database updating in LED display applications, a wireless advertising control system for LED advertising machines with low-cost, easy-to-update database and remote control is given. The system is based on the
Cortex-A7 MT6589 chip of the ARM microprocessor and uses Wi-Fi communication technology to build the wireless transmission peripheral circuit module and the IEEE802.11b protocol. It uses the RP-SAM interface that comes with the development board to match the Wi-Fi function of the connected mobile client, which realizes wireless control and high quality display of LED advertising display. The mobile client’s design of software is realized by Phone-Gap technology. The system is reliable in structure, low in hardware cost, convenient in software control, and satisfies the basic requirements for users to conveniently use it.
**Tips:** The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session. Please arrive at conference room 10 minutes before the session beginning to upload PPT into conference laptop.

# Session 6

**Afternoon, Sept 4, 2018 (Tuesday)**
**Time:** 16:00~17:00
**Venue:** Information Centre Reporting Hall

**Session 6: 4 presentations-Topic:** “Power System Modeling and Analysis”
**Session Chair:** Prof. Yang Zeng

<table>
<thead>
<tr>
<th>Presentation</th>
<th>Time</th>
<th>Title</th>
<th>Authors</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>K0011</td>
<td>16:00~16:15</td>
<td>The numerical simulation of a high power Hall effect thruster</td>
<td>Lai Li, Hulin Huang, Xidong Zhang, Guiping Zhu</td>
<td>Nanjing University of Aeronautics and Astronautics, China</td>
</tr>
<tr>
<td>K0023</td>
<td>16:15~16:30</td>
<td>Tuning Approach for Power System Stabilizer PSS4B using Hybrid PSO</td>
<td>Siyuan Guo, Shoushou Zhang, Junying Song, Yongsheng Zhao, Weijun Zhu</td>
<td>State Grid Hunan Electric Power Company Limited Research Institute, China</td>
</tr>
<tr>
<td>K0046</td>
<td>16:30~16:45</td>
<td>Short-term electricity load forecasting in Thailand: an analysis on different input variables</td>
<td>Su Wutyi Hnin and Chawalit Jeenanunta</td>
<td>THAMMASAT UNIVERSITY, Thailand</td>
</tr>
</tbody>
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**Abstract:**

- **K0011**
  - This work studied and presented a high-power Hall-effect electric propulsion thruster. The working Xenon gas is heated and ionized by nuclear energy to generate plasma which is injected into the channel. The plasma in the channel is described by two-temperature model consists of ions, electrons and atoms with the electron density of plasma above 1020 m^-3. The Lorentz force acting on the plasma makes the flow velocity increase obviously. The operating power of the thruster is about 20 kW. The mass flow rate of xenon is set at 1.56 g/s.

- **K0023**
  - As a multi-band PSS, PSS4B draws wide attention for its great potential in constraining the ultra-low frequency oscillations. In this paper, the crossbreed operation in genetic algorithm is introduced to particle swarm optimization (PSO) algorithm to form a hybrid PSO, so as to optimize PSS4B parameters. According to the single machine infinite system model, the phase frequency characteristic of excitation system without compensation is calculated by Heffron-Philips model. Based on phase frequency characteristic, the PSS4B parameters are tuned and excellent phase compensation effect is obtained. In Matlab/Simulink platform, the time domain dynamic response without PSS, adding PSS2B and PSS4B is compared and analyzed in detail. Simulation results show that the optimized PSS4B can provide effective damping in different frequency bands and have strong applicability.
Abstract- This paper suggests a support vector regression model to make short-term load forecasting in Thailand by different training inputs. The primary objective of this paper is to describe the importance of data pre-processing and the external factors for accurate forecasting. The Electricity Generating Authority of Thailand (EGAT) provides the half-hourly electricity load demand. For numerical analysis, a dataset of net peak load of Thailand for a period of weeks from January 2016 to December 2017 is selected. The historical load demand is filtered for each day by Local regression filtering technique. After filtering the data, the effectiveness of input variables is important for accurate performance. Mean absolute percentage error (MAPE) is used to evaluate the model performance. By comparing the three models, model which considerate the temperature and seasonal factors enhances the model performance.

K0005 Presentation 4 (16:45~17:00)

The Research of Anomaly Detection Method for Transformer Oil Temperature Based on Hybrid Model of Non-Supervised Learning and Decision Forests

Fei Xiao, Xiwu Leng, Kang Ye, Youlin Hu, Xiongli Li, Licheng Zhu
Tellhow Software Co. Ltd., Nanchang, P.R. China

Abstract-The anomaly detection of transformer’s oil temperature is critical and valuable issue for the safe operation of transformers and power system. In terms of the defects of traditional anomaly detection approaches of transformer’s oil temperature, such as high investment, poor generality, and non-real time, this paper proposed a hybrid model with non-supervised learning and decision forests method to detect anomaly of transformer’s oil temperature. Based on non-supervised clustering algorithm, firstly, the clusters of transformers’ working conditions are explored from big data sets of transformers. After that, the abnormal temperature threshold value of each cluster is deduced by hypothesis tests method and utilizes to tag anomaly in data sets of working conditions. Finally, the data sets with anomaly tags are inputted into random decision forests model to construct the classifier of abnormal oil temperature and generate the rules for anomaly detection. This method was validated by empirical data of main transformer in Shanghai, and the results represented its conspicuous competitive advantages to traditional oil temperature anomaly detection methods in the factors of real-time and accuracy.
Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session. Please arrive at conference room 10 minutes before the session beginning to upload PPT into conference laptop.

Session 7

Afternoon, Sept 4, 2018 (Tuesday)
Time: 16:00~17:30
Venue: Administration building 301
Session 7: 6 presentations-Topic: “New energy and renewable energy development”
Session Chair: Prof. Huiyan Cheng

K0035 Presentation 1 (16:00~16:15)
Optimizing Thermal Performance of Data Centers with Novel Local Partition Configurations
Hongjie Lu and Zhongbin Zhang
Nanjing Normal University, China

Abstract- The indoor environment of data center today has differed from the legacy data centers from the heat density to the air distribution. The energy consumption of cooling system has been taking up a large percent of the total energy of data centers. The reliability problem caused by local overheating and economic problem by undercooling attract the attention. Novel local partition configurations are proposed in this paper to optimizing the air distribution and thermal performance of data centers. A basic model and 6 partition models have been simulated to analyze the effectiveness of the novel configurations. The result proves that the configurations with local enclosed partition at tile No.2 show great performance in eliminating the hot spots and undercooling problems.

K3024 Presentation 2 (16:15~16:30)
The Solar Power Plant Prediction A case Study in Phitsanulok, Thailand
Withawint Srisuriyajan and C Thongchaisuratkrul
King Mongkut’s University of Technology North Bangkok, Thailand

Abstract- This research aims to find ways to predict the generated solar energy of 800 kW solar power plants. The investigated factors affecting on the plant consisted of irradiance, humidity, wind speed, ambient temperature, module temperature and real power. The plant located in Phitsanulok province, Thailand. Simple Regression Analysis and Multiple Linear Regression were used to analyse correlation. From the results, it is clear that solar energy directly depended on irradiance. Moreover it was an inverse of the module temperature. It is investigated that humidity and wind speed had not effect on solar energy generation. Furthermore real power value had little effect. Finally, the four correlations between generated solar energy and variables were used to predict. Four correlations were classified by temperature.

K0041-a Presentation 3 (16:30~16:45)
Energy and ancillary service dispatch by using DPSO-SQP
### K0044 Presentation 4 (16:45~17:00)

**Whei-Min Lin, Chung-Yuen Yang, Ming Tsai, Yun-Hai Wang**
National Sun Yat-Sen University, Taiwan

**Abstract** - The operation control taking part in the system demand and supply balance is based on the various types of plants, which can rapidly reflect the system load change, and the units shall cooperate with system balance for power adjustment. The appropriate supply of ancillary services requires the establishment of economic models that payment for these services. Special attention is given to Automatic Generation Control (AGC), Real-time Spinning Reserve (RSR), and Supplemental Reserve (SR) in Taiwan Power Company (TPC). AGC including regulation up and regulation down is the first level acting reserve which is regulated on the system operator. RSR is a unit that responds quickly when an accident occurs or the load increases. SR is an important role in keeping system security, since this reserve is used when RSR cannot satisfy the reserve needs. Ancillary services required unloaded generating capacity previously scheduled to be used by operators based on the online generating plants. Therefore, the entity responsible for operating the energy market should be considered the ancillary service schedules in unit commitment. 

### K0047 Presentation 5 (17:00~17:15)

**Xu Zhang, Xinhong Shi, Bingquan Zhu, Ke Sun and Yanwei Xiao**
China Electric Power Research Institute, China

**Abstract** - In recent years, China's clean energy has developed rapidly. The development level of clean energy does not match the local power consumption, resulting in a large number of abandoned winds and abandoned light. With the gradual completion of the UHV network, the transmission capacity between regions has been rapidly enhanced, providing a broad space for optimizing the allocation of resources across a wide range of areas and improving the level of clean energy consumption. In order to cope with the problem of difficult local consumption in clean energy delivery areas and current cross-regional power delivery methods, this paper considers the factors of the adjustment of the tie line plan and increases the consumption of new energy through more reasonable tie line planning based on the traditional unit commitment algorithm. A case study shows that the model proposed in this paper can promote cross-regional consumption of clean energy and improve the economics of the interconnected power grid.

### Study on Modification of Phase Change Energy Storage Materials Suitable for Biogas Fermentation

**Zhipeng Yang, Jinheng Li, Anxing Lai, Gang Li and Lei Wang**
School of Electrical Engineering and Automation, Xiamen University of Technology, China

**Abstract** - In this study, the problems of supercooling and phase separation of inorganic hydrated salts as phase change energy storage materials when applied to biogas generating devices were investigated. In the experiment, two common hydrated salts of zinc nitrate hexahydrate and disodium hydrogen phosphate dodecahydrate were selected as phase change materials, and tested at room temperature. Recording temperature and drawing the step cooling curve method, by adding different proportions of nucleating agent and dye to improve the supercooling and phase separation of the phase change materials, so that the reaction
The temperature of the biogas plant was always maintained at a suitable temperature (20-30 °C) to ensure the activity of microorganisms. The experimental results showed that sodium tetraborate decahydrate can effectively reduce the subcooling degree of zinc nitrate hexahydrate, and the azo (-N=N-) dye not only improved the solar absorption rate but also weakened the phase separation of phase change materials to some extent. This study proposed a possible reaction mechanism and provided reference for the development and application of other solar energy storage materials for bioreactors.

K1004 Presentation 6 (17:15~17:30)

The capacity optimization of the energy storage system used for peak load shaving

Kai Deng, Xiaobo Tang, Jie Lei, Zhenyao Qian and Bangcheng Wei
Nanjing Normal University, Nanjing, China

Abstract- With the development of society, the demand for power increases sharply, and the peak valley difference of load curve will affect the power quality and the life of generator set. The energy storage system can be used for peak load shaving and smooth out the power of the grid because of the capacity of fast power supply. Because of the high energy storage cost, it restricts the wide use of energy storage system, so it is very important for optimizing the storage capacity allocation. This paper analyses the economic benefits of the battery energy storage system used for load shaving in the distribution network. Through genetic algorithm, and considering the investment costs and economic benefits of energy storage system, the optimal value of energy storage capacity allocation is obtained by maximizing annual income as the objective function which is based on time-sharing electricity price. Finally, a 17-node distribution network is tested with typical daily load curve to justify the effectiveness of this method, and the results show that this method can not only play the role of peak load shaving, but also obtain certain profits.

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session. Please arrive at conference room 10 minutes before the session beginning to upload PPT into conference laptop.

Session 8

Afternoon, Sept 4, 2018 (Tuesday)
Time: 16:00~17:30
Venue: Administration building 501
Session 8: 6 presentations-Topic: “Smart Grid Design and System Analysis”
Session Chair: Dr. Lei Wang and Zhineng Dai

K0003 Presentation 1 (16:00~16:15)

Droop control Based Seamless Transfer Strategy for Three-phase Converter in Microgrid
ZHAO Guopeng, ZHOU Xinwei, YANG Hongwei, XU Feng and WANG Yanjie
North China Electric Power University, China

Abstract-This paper proposes a seamless transfer strategy based on the droop control strategy for three-phase converter in microgrid, which consists of the voltage limiter and the frequency
limiter. In grid-connected mode, both the two limiters don’t work, and the VSC is controlled by PQ control, transmitting constant power between micro-sources and power grid. When the unplanned islanding occurs, the PCC voltage and frequency may exceed the allowable range because the reference of active power and reactive power are not equal to the loads power. Then the voltage limiter and the frequency limiter begin to take effect, ensuring the power supply quality for loads. The difference between the input signal of these two limiter and the output signal will pass through the proportional regulator, and the new references of active power and reactive power can be obtained according to the droop curve. After the islanding detection detects the islanding condition, the control strategy will be changed to the droop control. All the converters can work in parallel and provide the voltage and frequency supply for loads. At last, the simulation results verified the proposed seamless transfer strategy.

K0020 Presentation 2 (16:15~16:30)
Study on Coordinated Optimization of the Grid Voltage Control Strategy Considering Comprehensive Cost
Jingbo WU, Jianling ZHANG, Weijun ZHU, Dijun HU, Xinfan JIANG, and Wei ZHONG
State Grid Hunan Electric Power Co. Ltd. Power Research Institute, China

Abstract- The spoilage of the discrete reactive power devices such as shunt capacitor or on-load tap changer by control are far greater than that of the continuous reactive power devices such as generator or SVG. To reduce the comprehensive cost including the grid loss and the device spoilage, This paper proposed a novel grid voltage control coordinated optimization strategy. The comprehensive cost including the grid loss and the device spoilage is used as an objective function. The corresponding calculation method based on improved genetic algorithm is presented. The proposed strategy would be combined with the three-level voltage control mode of existing AVC systems. The simulation contrast results in IEEE-14 system show that the proposed strategy is more reasonable than the traditional control strategy without consideration of the discrete reactive power devices spoilage. Especially in the case of network load periodic change, the repeated controls of the discrete devices are effectively avoided by using the proposed strategy.

K0038 Presentation 3 (16:30~16:45)
Deep learning algorithm for preliminary siting of substations considering various features in distribution network planning
Liang Feng, Can Cui, Runze Ma, Jian Wu, Yang Yang, Lujie Qi, Xiaolei Zhang, Shengyuan Liu
Zhejiang University, China

Abstract- Substation siting and sizing planning is one of the important contents of distribution network planning, which directly affects the results of subsequent distribution network planning, and affects the quality of power supply and the economy of power grid operation. Given this background, a deep learning algorithm for preliminary siting of substations in distribution network planning is proposed in this work. Features related to the principle of siting of substations are extracted and multichannel data characterization are utilized. Then, the features are integrated into a convolutional neural network (CNN), which is one of deep
learning algorithms, based on actual geographical relationships. Next, the preliminary siting of substations for the subsequent planning process is completed. Finally, the validity of the proposed algorithm considering different input features is demonstrated on a distribution network of one certain province in China by case studies and comparisons. The simulation results show that the proposed deep learning algorithm for preliminary siting of substations is more accurate with more input features, and is better than shallow learning algorithms, thus can be employed to preliminary siting of substations in distribution network planning.

K1005 Presentation 4 (16:45~17:00)
Study on Power Quality Impacts of Rural Distribution Network with Large-scale Heat Pumps
Zhenwei LI, Wenliang ZHU, Pengfei SUN, Siyao HU, Kaiyuan JIN and Jianhua YANG
China Agricultural University, China

Abstract- With the advance of the “Coal-to-electricity” program in northern China, heat pump units are used more and more for rural household heating at a high operating efficiency. When large-scale heat pump units are connected to rural distribution networks, the power quality problems should be considered because of the voltage sag, the current surge, and the harmonics caused by the units. The typical feature, the efficiency index, the operation process and the types of the domestic heat pump units are introduced. The starting characteristics of different heat pump units are compared. Impacts on distribution networks with heat pumps are discussed, including the additional load forecast method of heat pump units and the power quality problems. The startup current of the fixed-speed heat pump is too large to cause voltage sag. The variable-speed heat pump may inject the harmonic current into distribution system. A rural distribution network are simulated with the actual measurement data in order to analyse the voltage sags during the starting process of the heat pump units with different permeability of the units. The corresponding simulation results can be used as the reference for the further implementation of the “Coal-to-electricity” program.

K2006 Presentation 5 (17:00~17:15)
The Power Grid Development with Distributed Wind Plant Growth Based on Coordination Analysis
Tan Yudong, Li Xianghua, Zhang Pengfei, Li Yong, Peng Dong
State Grid Hunan Electric Power Corporation Limited Economic & Technical Research Institute, China

Abstract- The wind plant capacity developed continuously since 2009. However, the wind plant type changed quietly, those preformed in the unit capacity increased from 1MW to 5MW, the wind farm located from onshore wind power to offshore wind power, and the large-scale distributed wind plant transformed into small-scale distributed one. Recently, the distributed wind plant was growing rapidly for policy guidance, which has a great influence on the power grid operation because of the change of the power supply layout. How to analyze the influence is an important matter to power system development. The analyzed results will decide the trends of the distributed wind plant in future. Therefore, the coordination analysis of distribute wind plant growth is crucial to those developments. In this paper, the reasonable distributed generation scale arrangement was discussed based on the
difference measures.

**K3018 Presentation 6 (17:15~17:30)**

The Research on P2G Gas-Electric Hybrid Optimal Economic Dispatch Strategy  
**Zheng Zhang,** Tianran Li, Quan Liu, Chao Yuan  
Nanjing Normal University, China

*Abstract*- In many forms of the multi-energy complementary system, the regional multi-energy complementary distributed energy distribution system including distributed photovoltaic power generation (PV) and power-to-gas (P2G) equipment is a typical form. The P2G system uses non-peak excess power to produce hydrogen gas. Hydrogen can be stored directly for use as fuel, or it can be converted to natural gas for storage, enabling conversion of electrical energy to chemical energy. In this paper, the energy conversion and interconnection between electric energy and gas realizes the coordinated operation of distribution network and natural gas network, reduces the distribution pressure of distribution network, and improves the economic efficiency of energy utilization. First, the principle of P2G technology is introduced, and then the mathematical models of source device, conversion device and energy storage device are constructed separately. On this basis, an economic optimization-based micro-network system optimization scheduling model is established to investigate the economic benefits of gas-electric hybrid. Finally, the micro-grid system of the two scenarios is compared in the example, and the results prove that P2G has a good promotion effect on the economic benefits of the park.

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**Poster Session**

Afternoon, Sept 4, 2018 (Tuesday)  
Time: 15:15~16:00  
Venue: Foyer  
Chair: Prof. Yongping Li  
25 Poster presentations

**K0010 Poster Presentation 1**

Study on Data Selection Method of Historical Operation Data for Large Scale Power System  
**Hongyang Dai,** Ying Lv, Zihong Yu, Guangming Lu, Chang Xie and Jinxiu Hou  
Power System Department, China Electric Power Research Institute, China

*Abstract*- A data selection method based on similarity measurement and support vector machine (SVM) is proposed. At first, the critical clearing time (CCT) is used as the class label, and features which are strongly correlated with the class label will be extracted. Secondly, a SVM classifier is trained on the initial training instances with extracted features, and the instance which is misclassified will be removed. Thirdly, the concept of the most similar instance pair is proposed, which two instances with the minimum distance are
selected, and then removes the eligible instances which is noisy and redundant instances. The proposed method which can simultaneously prune data in horizontal and vertical directions is tested by online historical data of an actual large scale power system. Experimental results demonstrate that more than 70% features and 30% instances are reduced, and the accuracy and storage reduction are also improved. This method can be well used with the good performance in large scale power system.

K3016 Poster Presentation 2
Design and Energy Efficiency Management of Cascade Hydropower System
Guanlu Yang, Zehong Huang, Shuyang Wang and Minxu Wu
Huaqiao University, China

Abstract- Under the background of energy shortage and environmental pollution, the development and utilization of building hydropower power generation and utilization of resources positively respond to the construction of national sponge city. In this paper, the concept of building cascade hydropower is put forward from the view of making full use of building water energy, and the upper computer of building cascade hydropower power management system is built by using LabVIEW software platform. The calculation and measurement error of hardware circuit is reduced, and the design of building cascade hydropower power management system is completed. The feasibility and advantage of building cascade hydroelectric power generation system are verified through field test.

K0001 Poster Presentation 3
Fault ride through strategy for Virtual Synchronous Control based Doubly-Fed Induction Generators
Xuekun Cheng, Hui Liu, Peng Song and Hao Jiang
State Grid Jibei Electric Power Co.Ltd. Research Institute, China

Abstract- Virtual Synchronous Control (VSynC) strategy for Doubly-Fed Induction Generator (DFIG) has attracted much attention because of its advantages in providing dynamic supports of frequency and voltage. In this way, most researches of VSynC strategy concentrate on analysis of its electromechanical behaviours, but pay little attention to its electromagnetic transient responses and fault characteristics, which may hinder its promotion in engineering application. This paper pays special attention to the electromagnetic transient behaviours of VSynC-based DFIG and proposes a voltage compensation VSynC strategy to implement fault ride through during symmetrical grid faults. The proposed strategy improves the transient response of existing VSynC strategy, capable of limiting the overcurrent in DFIG rotor circuits and suppressing the oscillations of electromagnetic torque. Simulation results validate the effectiveness of the proposed strategy.

K0040 Poster Presentation 4
Study on the electrochromic label for high-voltage equipment with wo3
Linong Wang, Enwen Li, Bin Song and Yaqi Fang
Wuhan University, China
**Abstract** - Whether the equipment is charged or not is a working procedure that must be carried out to ensure the safety of personnel during the power failure maintenance work on the power transmission and transformation equipment. At present, UHV power transmission equipment mainly uses contact, non-contact electroscope to check whether the equipment is electrified. However, this type of electroscope needs a wide response range because the stray capacitance to ground is greatly affected by the actual working environment and operating position. At the same time, the contact type high voltage electroscope generally needs to be used with the insulated test pole. As the voltage level rises, the required safety distance increases. The length and deflection of the test pole cannot meet the requirements. The overall quality is larger and the operation is inconvenient. The use of material colour changes to indicate the charged state of the device is a promising technical means. Based on the electrochromic technology, this paper makes use of tungsten trioxide materials to prepare charged state indicator materials for UHV transmission equipment, and characterizes whether the equipment is charged by the colour change of materials. Experiments show the effectiveness of the material.

**K0036 Poster Presentation 5**

Analysis of Hierarchical and Time-phased Model of Large-scale Power Grid Based on Fp-growth Algorithm  
**Tianyue Wang**, Jinxiu Hou and Zhihong Yu  
North China Electric Power University, China

**Abstract** - The scale of UHV AC/DC hybrid power grids in China is continuously expanding, and the operational characteristics of power grids have undergone profound changes. With the advancement of measurement technology and communication technology, power data has grown rapidly. Therefore, data mining technology is required to provide safety warnings and risk prevention, and intelligently adjust control strategies to help dispatchers correct the operating status of the power grid. This paper adopts association rules analysis based on fp-growth to construct a hierarchical and time-phased analysis model of power grid, giving association rules for different security and stability levels of the power grid at different time phases. Based on actual historical data of the large-scale power grid and the application of hierarchical and time-phased analysis mode, the association rules of overload conditions of different time periods are extracted.

**K3015 Poster Presentation 6**

Power Quality Monitoring and Energy Efficiency Management of Microgrid based on wind-PV-ES Hybrid System  
**Guanlu Yang**, **Minxu Wu**, Yang Wang and Zehong Huang  
Huaqiao University, China

**Abstract** - With the vigorous development of new energy power generation technology, the use of a large number of power electronic components and non-linear loads seriously threatens the power quality of microgrid systems. Therefore, it is necessary to monitor the power quality parameters Therefore, it is necessary to monitor the power quality parameters during its operation in real time so as to maximize the use of energy resources. This article focuses on
the overall design of the microgrid power quality monitoring system. In the hardware design part, this paper uses two chips of DSP and FPGA to collect, process and analyze the signals of the power grid. Mainly includes the system overall design idea, the signal conditioning module design, the digital signal processing circuit, the communication port circuit and so on. Based on this, combined with the virtual instrument technology, designed and completed a micro-grid power quality inspection platform based on Labview. This paper also establishes the reactive power compensation scheme of the microgrid TSC system by using Matlab/Simulink software, further improves the power quality and power factor of the operation, and verifies the power quality improvement scheme of the microgrid through simulation.

K3028 Poster Presentation 7
The study of banana leaf fiber based biomass pellets fuel
Xinwen Wang, Shimin Wu, Xin Rao, Jie Chi, Su Xu
School of Environmental Sciences and Engineering, Xiamen University of Technology, China

Abstract- The use of agricultural and forestry waste to produce energy-efficient biomass energy is one of the most energy-saving methods. Through the resource study and regional economic analyses, sawdust, hay and banana leaf fiber were selected as raw materials to study the main influencing factors of the palletization due to the substantial amount. Under the optimum condition: sawdust/hay ratio of 1.49:1, fiber/particle ratio of 1:20 and the fiber length of 2.05cm, the crushing resistance increased by 12.12% and the calorific value of the mixed fuel is 17014kJ/kg. The results show that adding banana leaf fiber to hay and sawdust can greatly improve the forming rate of biomass fuel, the heat value and ash content of biomass meet the national standard. There are a large number of agricultural and forestry waste can be well utilized.

K3010 Poster Presentation 8
The Effect of Silicon Fertilizer on The Growth of Chives
LONG Jiang-xue, CHENG Hui-yan, DAI Zhi-neng, LIU Jian-fu
Xiamen University of Technology, China

Abstract- Potted plants of chives to explore the growth effects of applying silicon fertilizer with 5 levels (0, 180, 360, 540, 720 mg/kg) for 3 weeks. Variables measured of plant development included fresh weight of whole plants, leaves, stalks; plant height; moisture and chlorophyll content in leaves. The results showed that the application of silicon fertilizer during 180-540 mg/kg concentration could improve the biomass weight and the growth height, increase chlorophyll and moisture content of chives leaves. The optimum effective silica concentration was 360 mg/kg, whereas the plants growth were decreased and even negatively affected with the increase of silica concentration to 720 mg/kg. This study provided a research foundation for the promotion of silicon fertilizer in the cultivation of chives and the further broadening of the application of silicon fertilizer.

K3029 Poster Presentation 9
Application of Deodorant in Odor Control of Municipal Solid Waste
Zhinenget Dai, F S Zeng, J Liu, A L Yang and H Y Fu
Xiamen University of Technology, China

Abstract- More than 70% of China's municipal solid waste is disposed by landfill, which has caused lots of environmental problems, among which odor pollution is one of the most serious problems. The stench from landfills can seriously affect the daily life of nearby residents and cause a variety of diseases. Due to its wide spread and significant influence, it usually causes mass incident, and lead to bad social impact. An economical and efficient deodorant was developed in this paper. The results showed that the deodorant developed in this paper could remove 47% of ammonia gas, 40% of isobutylene and 20% of other gases with 20 min. The apparent deodorization rate in this paper is relatively low, which may be caused by the small experimental container and the continuous production of odor, the actual deodorization rate should be more than 50%. Moreover, the overall deodorization rate of the deodorant developed in this paper is higher than that of the commercial deodorant, but the cost is only 60% of that of the commercial deodorant.

K3023 Poster Presentation 10
Hierarchical topology analysis method for substations based on electrical bays
Xie Zhang, Z F Xu, B Zhou, H F Wang and H X Pan
NARI Technology Co., Ltd., China

Abstract- According to the requirements of the advanced applications in smart substations, hierarchical topology analysis method based on electrical bays is proposed in this paper. Based on the node connection relationships of each device in the substation, all primary devices can be organized into the hierarchical structure as “transformer (winding) - bus - electrical bay”. The typical 3/2 circuit breaker connection and the inner bridge connection are also recognized. On this basis, the identification of the static topology and the judgment of the dynamic connectivity in the main wiring diagram of the substations are realized, which is helpful in the quick search of the devices. The topology analysis method introduced in this paper will effectively support the advanced applications for substations such as fault diagnosis, state estimation, the status analysis of electrical bays and so on.

K3025 Poster Presentation 11
Research on Logic Optimization and Reliable Calculation Model of Satellite Based Wildfire Monitoring for Power Transmission Line
Zhenzhen Zhou and Gang Chen
EHV, China Southern Power Grid, China

Abstract- In order to improve the accuracy of wildfire monitoring for transmission line based on satellite sensing data, this paper proposed a new method that can be used to verify different data from synchronous satellite and polar orbiting satellite mutually. Also, this paper optimized the wildfire identification logic by considering surface elements, wide-area meteorology, cultural environment, and history records, and then proposed a corresponding calculating model to evaluate the reliability of wildfire detected. Relyed on the improvements above, the accuracy of wildfire monitoring of EHV Power Transmission Company increased.
almost 30% in April to May 2018.

K1002 Poster Presentation 12

Preferably Receiving End’s Infeed Modes for UHVDC Power Transmission
Zhen Bi, Qiang Guo, Qinyong Zhou, Yilang Jiang, Xiaohui Qin
China Electric Power Research Institute, China

Abstract- With unceasing increase of traditional HVDC transmission capacity, it became more and more obvious that the voltage supporting ability of receiving end power system restricts the development of HVDC power transmission, which also blocks the application of HVDC. This paper according to nodal impedance matrix, short-circuit ratios of the receiving end system under hierarchical connection mode and multi-terminal feed mode are derived. Besides, the voltage support capabilities of different modes are analyzed. The simulation was carried out and verified the feasibility and rationality of multi-terminal feed mode, which proved the UHVDC multi-terminal feed mode is helpful to increase the voltage support capability and enable the reasonable power flow distribution between 1000kV layer and 500kV layer.

K1001 Poster Presentation 13

Small-Signal Modelling and Stability Analysis of Current-Controlled Virtual Synchronous Generators
Dawei SUN, H LIU, P SONG, S ZHU and Z WEI
State Grid Jibei Electric Power Co.Ltd. China

Abstract- Virtual Synchronous Generators (VSG), as an effective mean to improve the frequency and voltage regulation ability of the renewable power, had aroused wide concern. Researchers have proposed several VSG implementations, which can be classified into two categories: voltage-controlled VSG and current-controlled VSG. Voltage-controlled VSG have been extensively studied. However, few researches focused on current-controlled VSG. In this paper, we concentrated on the current-controlled VSG and its stability problem. Firstly, a small-signal model of current-controlled VSG was established to identify the oscillation modes of grid-connected VSG system. Moreover, the developed model was used to investigate damping characteristics of the system under various scenarios and with different control parameters. The results revealed that stability of VSG system was sufficiently impacted by virtual inertia and phase lock loop in VSG. Under some unfavourable conditions, current-controlled VSG would contribute to high-frequency or subsynchronous oscillation.

K0027 Poster Presentation 14

Research on improved droop control strategy based on virtual impedance
Xiao Min Liu, B C Lu, Z P Ren and R X Zhang
Liaoning university of technology, China

Abstract- Due to the property of line impedance and other factors in micro-grid, power supplied by distributed generation units could not be shared accurately based on their traditional droop coefficient. To improve the power sharing accuracy of distributed generation
units, improved droop control of power sharing strategy which was based on virtual impedance is proposed in this paper. Simulations results show that improved droop controller can achieve good load active and reactive power sharing.

K0022 Poster Presentation 15

A new software phase-locked loops

Cunbing Gui, Zhangbao Chen and Xuehui Luo
Guangzhou Institute of Technology, Guangdong, China

Abstract- A new type software phase-locked loops is proposed. The amplitude integral and selective characteristic of frequency are used to form the positive frequency fundamental filter. The K is derived, the principle of the variable sampling period phase-locked loops is further analyzed, it’s mathematical is established, and the regulators parameters is optimize designed. Simulation and experiment show that the proposed phase-locked loops can lock the phase and frequency of the positive sequence fundamental voltage quickly and accurately, So it can provides a reliable base for grid-connected system.

K3030 Poster Presentation 16

Interpolation estimation method of tropospheric delay for long baseline network RTK based on support vector machine

Jian Deng, Miaoqiang Xu, Xuexiang Yu and Aiguo Zhang
Xiamen University of Technology, China

Abstract- In order to solve the problem of low precision of tropospheric delay interpolation under the long-distance sparse reference station, a method of tropospheric delay interpolation estimation based on support vector machine (SVM) theory was proposed. Firstly, the troposphere was assumed to be an infinitely thin single-layer membrane, and with the known information of reference stations, the puncture point coordinates and zenith tropospheric delay of each reference station on each visible satellite in the single-layer membrane were obtained. Then, the puncture point coordinates and zenith tropospheric delay were taken as training samples to optimize the appropriate core parameters of SVM and establish the SVM model of tropospheric delay. Finally, two sets of network RTK data with different lengths were selected to compare and analyze the effect of the interpolated tropospheric delay. The results showed that under the long-distance reference station, with the SVM tropospheric delay model established in this paper, the tropospheric delay accuracy of the interpolation estimation is better than 2cm, and the estimation error is generally stable, and the interpolation effect of satellite in different systems is basically the same.

K1003 Poster Presentation 17

Performance analysis of the BIPV of an industrial park in Wuhan

Ba Jingkang, Huang Xiaoli, Yan Guogang and Wang Xiaojing
Wuhan Textile University, China

Abstract- The performance of BIPV system is a crucial factor for its development. This paper chooses PV arrays installed on an industrial park buildings in Wuhan as a research object. The
The performance of PV array has been investigated at different tilt angles and orientations on the meteorological conditions of Wuhan. The performance of the amorphous silicon BIPV system and that of the polysilicon BIPV system are presented. The two BIPV systems are both 30 kW, with a tilt angle of 20° and facing south. The performance analysis shows that average monthly output energy of the polysilicon system and that of the amorphous silicon system are 2440.85kWh and 2209.14kWh respectively. The performance of amorphous silicon BIPV system is better in May, June, July and August. The maximum monthly output energy can be obtained in August (3768kWh and 3308kWh). For the amorphous silicon BIPV systems facing south and with different tilt angles of 20° and 10°, more output energy can be obtained from the amorphous silicon BIPV system with a tilt angle of 20°. The performance of the amorphous silicon BIPV systems oriented facing south with a tilt angle of 10° and that of the amorphous silicon BIPV systems oriented facing north with the same tilt angle are also analyzed respectively in this paper. These analyzes will provide a reference for the development of BIPV in Wuhan.

**K0034 Poster Presentation 18**

Optimal design of distributed energy systems in rural area of developing country: a case study of Guanzhong area, China

Y Zhu, X X Yan and Quanling Tong
Xi'an University of Architecture and Technology, China

*Abstract* - This paper optimized the design of renewable distributed energy systems (R-DES) based on interval linear programming. The total cost of this system is used as an objective function of system configuration problem. The optimal configuration of this system is obtained. In order to prove practicability of this system, this paper took the remote rural areas of Guanzhong as an example to optimize energy supply and operation mode. Through calculations, it can be seen that this system reduced power supply by 29.0%~63.6%, and carbon emission reduction rate is 4.0%~49.6%.

**K0045 Poster Presentation 19**

Study on Performance Optimization of SCR Denitrification of an Ultra-low Emission Coal-fired Power Unit

Li Bing, Song Yongqiang, Zhang Qilong, Zhou Can and Duan Haoran
Huadian Electric Power Research Institute Co, LTD. China

*Abstract* - The distribution of NOx concentration, flue gas flow field and temperature at the inlet and NOx concentration at the outlet of SCR denitrification were measured in a 330MW ultra-low emission coal-fired power unit, and ammonia injection optimization was carried out to improve the performance of SCR denitrification. The test results show that the distribution of NOx concentration and flue gas temperature at the inlet of SCR reactor is relatively uniform, and the distribution of flue gas flow field at the inlet of SCR reactor is nonuniform. The distribution uniformity of NOx concentration at the outlet of SCR reactor is poor before optimization. The NOx concentration distribution at the outlet of SCR reactor is improved by ammonia injection adjustment, and the relative standard deviation of NOx concentration distribution at the outlet of SCR reactor A and B decrease from 48.7% and 33.8% to 12.1%.
and 14.7%, respectively.

**K3005 Poster Presentation 20**

Oil Price Factors: Forecasting on the Base of Modified ARIMA Model  
*Anthony Msafiri Nyangarika, Bao-jun Tang*  
Beijing Institute of Technology, Beijing, China

*Abstract*- The paper proposes the modification of ARIMA model for finding the parameters of estimation and forecasts using exponential smoothing. The study use data Brent crude oil price and gas prices in the period from January 1991 to December 2016. The result of the study showed an improvement in the accuracy of the predicted values, while the emissions occurred near the end of the time series. It has minimal or no effect on other emissions of this data series. The study suggests that investors can predict prices by analyzing the possible risks in oil futures markets.

**K3006 Poster Presentation 21**

DSGE Model of the Russian Economy: Economic Impact of Oil Price  
*Anthony Msafiri Nyangarika* and *Bao Jun Tang*  
Beijing Institute of Technology, Beijing, China

*Abstract*- In the paper the DSGE model proposed on the base of the theory of adaptive expectations. The aim of this work is to describe the possibility of using DSGE models for forecasting the Russian economy. This paper examines how the methodology of dynamic stochastic general equilibrium models can be applied to predict the yields of government bonds in 2018-2020, the proposed modification of the Taylor rule and the components of the prediction rate of the Russian ruble, characteristic of resource economies, where there is a close relationship between the exchange rate and oil price. It proposed the forecast of main macroeconomic indicators in the period 2017-2020 years (economic growth, inflation, oil price, exchange rate, Bank of Russia key rate and effective yields of government bonds). The practical significance of this work lies in the structuring of existing knowledge on the applicability of DSGE models of the Russian economy. The article also outlines the macroeconomic trends and modeling the conditions of an unstable economic situation in Russia. The parameters of monetary policy are also significant for determining the government bond yields. In addition, this article sheds light on forecasting the term structure of interest rates based on macroeconomic indicators.

**K2001 Poster Presentation 22**

Coordination of Multistage Scheduling Strategy in Cogeneration System  
*Zhenyu Li, Dong Zhao, Qing Ye and Guibo Ma*  
State Grid Liaoning Electric Power Supply Co. Ltd, Fuxin Power Supply Company, China

*Abstract*- Due to the characteristics of wind intermittent, fluctuating, anti peak, and large prediction error, large-scale wind power access to the grid has brought negative impact on the planning and operation of the power grid. The contradiction between the power load and the peak and valley of the heating load expands the difficulty of the power grid to reduce the wind power. In addition, the thermoelectric coupling characteristic of the cogeneration unit
determines the limit of the electric output regulating range of the thermoelectric unit, and the planning and operation policy of the thermoelectric co production unit with thermal power intensifies the problem of the high incidence of the discarded wind in the heating season. According to the analysis of the energy flow model of the electric heating combined system, the energy flow method is used to optimize the dispatching model and improve the capacity of wind power consumption during the heating period. The results show that the use of the electric heating station can increase the low valley electric load, reduce the thermal power output of the unit and leave the space for the wind power network. The indoor temperature of the user affects the heat load, and then affects the total amount of the wind power consumption, and the optimal scheduling results calculated by the optimized scheduling model considering the constraints of the heat transfer link are more accurate and feasible.

K2002 Poster Presentation 23

Power Grid Partition Method for Black Start Based On Complex Network Theory

Xu Fubin, Zhang He, Li Run, Cai Jian
State Grid Dalian Power Supply Company, Dalian, China

Abstract- The paper proposes one power grid partition method for black start based on complex network theory. The method is composed of splitting algorithm and agglomerative algorithm. The former algorithm divided grid to some temp zone according to the number of black-start unit, which determines the basic structure of the partition and reduces the number of iterations in agglomerative process. The latter algorithm redefines the line weight and weighted modularity based on flow distribution and network topology, then merges neighbouring temp zone to maximum weighted modularity. The method can reflect the close degree of the partition, accurately assess the partition quality and determine the optimal number of partitions. The simulation results on IEEE 39-bus test system illustrate the validity of this methodology.

K2004 Poster Presentation 24

Development of a Comprehensive Transformer Material System Analyzer

Yuan Gao, Zhiwei Zhao, Xinyu Wang and Xin Hu
State Grid Tieling power supply company, China

Abstract- In view of the phenomenon that the existing dry-type distribution transformers are replaced by aluminum and copper, there is no aluminum wire or aluminum wire-wrapped dry-type transformer standard for distribution in China, and it is impossible to accurately detect whether the dry-type transformer exists in aluminum-based copper. Based on this situation, a high-precision distribution network dry-type transformer comprehensive test system is developed. This system is a combination of transformer property testing, material testing, capacity testing, direct resistance testing, and ratio-ratio testing. It is for dry-type transformers. A high-precision comprehensive test system specially developed. The data conversion method of DC resistance and transformer capacity is mainly used. The method of accurately measuring the transformer ratio and the method of determining the material based on the transformer current density are used to detect whether the dry transformer is replaced with aluminum and copper. Accurately testing the transformer capacity can accurately detect whether the user changed or replaced the transformer nameplate. It can also accurately measure power frequency parameters such as capacity, load loss, no-load loss, impedance voltage, and no-load current of various transformers, thereby improving the ability to detect
Research on steady-state power distribution calculation technology of electrothermal coupled regional energy system
Jinping Shan, Zhenyu Li, Gang Chen and Xin Wang
State Grid Liaoning Electric Power Supply Co. Ltd, Fuxin Power Supply Company

Abstract: When large-scale power grids are connected to the power grid, it is conceivable that adverse effects on the operation and planning of power grids can be imagined. Therefore, wind power has characteristics such as intermittency, volatility, anti-peak characteristics, and large prediction errors. At the same time, the ability to absorb wind power is also weakened by the contradiction between the peak load and the heating load. In addition, due to the thermo-electric coupling characteristics of the cogeneration unit, ie, "heating with electricity," this characteristic directly determines that its heat output severely limits the regulation of the electric output. The results of the study indicate that the co-production unit's electric power and thermal power are coupled. Strong nature, the peak load capacity of the unit is greatly affected by the heat load, and the electric power and thermal power distribution lacks a unified calculation and analysis method, which restricts the means of improving the peaking capacity of the unit by controlling the thermal power output of the unit, and through implementation, establishes the main power equipment, The steady-state power model of the thermal equipment, the steady-state power analysis and calculation method of the regional energy system of the power thermocouple, and the realization of adjusting the thermal load related parameters to improve the peak capacity of the thermal power unit.

Dinner
18:00
Wei Ai Restaurant

List of Listeners

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One Day Visit and Tour

Sept 5, 2018 (Wednesday)
9:00--17:00

9:00: Assemble at the outside of Network Management Division, Xiamen University of Technology

9:00-11:30: Visit the Environment Engineering Laboratory and Wind Tunnel Laboratory in Xiamen University of Technology.

11:30-12:00: Free talk and take photo

12:00: Lunch

13:00: Sightseeing the Xiamen City.
Gulangyu, a Historic International Settlement, UNESCO World Heritage site
The Gulangyu, Gulang Island or Kulangsu is a pedestrian-only island off the coast of Xiamen, Fujian Province in southeastern China. A UNESCO World Cultural Heritage Site, the island is about 2 km² (0.77 sq mi) in area, and is reached by a 5-minute ferry ride from downtown Xiamen. Although only about 20,000 people live on the island, Gulangyu is a major domestic tourist destination, attracting more than 10 million visitors per year, and making it one of China's most visited tourist attractions. Gulangyu not only bans cars, but also bicycles. The only vehicles permitted are small electric buggies and electric government service vehicles.
Gulangyu Island is renowned for its beaches and winding lanes and its varied architecture. The island is on China's list of National Scenic Spots, is classified as a 5A tourist attraction by the China National Tourism Administration (CNTA), and ranks at the top of the list of the ten most-scenic areas in the province.

17:00: Arrive at the Xiamen University of Technology
Feedback Information

(Please fill this form and return it to conference specialist during the conference days.)

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<tr>
<th>Personal Information</th>
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<td>Conference Name and Paper ID</td>
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<th>Please indicate your overall satisfaction with this conference with “✓”</th>
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<td>Very Satisfied</td>
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<th>Are You A Member of HKCBEES</th>
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<td>Yes: No:</td>
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<td>(If “No”, you may apply membership from <a href="http://www.cbees.org/list-34-1.html">http://www.cbees.org/list-34-1.html</a> )</td>
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<th>Do You Willing to Receive HKCBEES Future Conferences Information Via E-mail</th>
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<td>Yes: Absolutely No:</td>
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<td>(If “No”, please tell us the main reason)</td>
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<td>Yes- But not to my full extent: No:</td>
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Would you please list the top 3 to 5 universities in your city?

Other Field of Interest

Any Other Suggestions/Comments

Thank you for taking time to participate in this conference evaluation. Your comments will enable us to execute future conferences better and tailor them to your needs!