Electrical Insulation News in Asia

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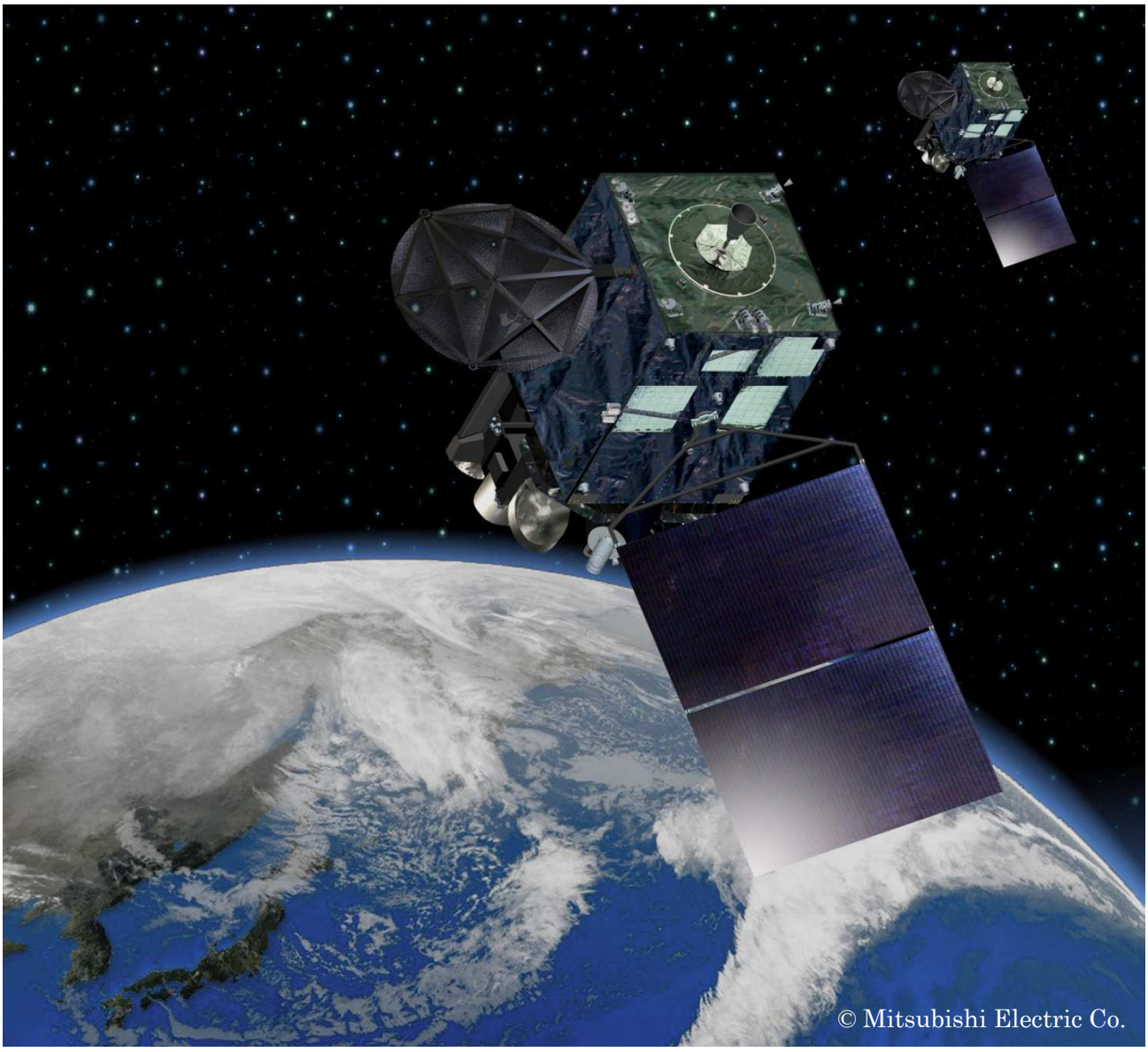

IEEJ

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PREFACE

Prof. Masayuki NAGAO

Starting Electronic Publication of EINA Magazine

In 1972 I started my academic research life in joining Prof. Ieda's laboratory in Nagoya University as a 4th year bachelor course student. At that time there was no personal computer and there just appeared only a commercial type programmable calculator. I asked Prof. Ieda to buy the programmable calculator made by SONY whose size and weight were fairly large. Using this calculator I made the programs to get a mean value and its standard deviation of experimental data, which greatly contributed to reduce the time of data analysis of laboratory members. In 1980 I joined Prof. Kosaki's laboratory in Toyohashi University of Technology as a Lecturer. After 7 months I got the invitation letter from the Alexander von Humboldt Foundation to do the research work on partial discharge degradation problem in Prof. Kärner's laboratory in Technical University of Braunschweig for one and half years. When I returned to Japan in 1982, Dr. Tanaka and Dr. Okamoto in CRIEPI have developed a ϕ-q-n pattern analysis method on partial discharges using a large size computer. Being stimulated by this development we also developed the first portable type ϕ-q-n analyzing system using the personal computer SHARP MZ-80 just appeared in the market. The computer enables this new type PD data analysis which nowadays expanded all over the world. Thus the appearance of computer brought us the revolution of research works including a computer simulation.

As for the mailing system computers also brought a revolution. The Internet technology almost substituted the ordinary post system for the e-mail system. The SNS (Social Network Service) system appeared and becomes now a common and useful tool for many people. How to utilize this SNS tool for the activity of our EINA (Electrical Insulation News in Asia) magazine is one of our important issues.

In the field of books and magazines publication, although the revolution pace has been slowest, electronic publications have been enlarging, especially in scientific paper fields. EINA magazine was firstly issued under the strong leadership of the late Professor Ieda in 1994 in order to strengthen a mutual information exchange on electrical insulation technology among Asian countries and this year we count the 22nd Issue.

EINA magazine has been mainly published in printed paper form up to the last issue, but from this year we decided to publish the magazine mainly in electronic PDF form to reduce the printing and mailing costs. Before this decision we collected the reader's opinions and the majority was positive. As the chair of EINA magazine committee I would like to ask you sincerely to accept our decision. If you feel some inconvenience in the electronic form, please don't hesitate to request us to send the ordinary type EINA magazine. We still continue to print the ordinary type ones for the distribution in the international conferences to advertise our magazine. We want to develop together with you !

Dr. Masayuki NAGAO

Chair of EINA magazine committee
Professor of Toyohashi University of Technology, Japan

OUTLINE OF TECHNICAL COMMITTEES IN IEEJ

Dielectrics and Electrical Insulation (DEI)

Chairperson: Yasuhiro Tanaka (Tokyo City University)
Secretaries: Hiroyuki Nishikawa (Shibaura Institute of Technology)
Yoitsu Sekiguchi (Sumitomo Electric Co. Ltd.)
Assistant Secretaries: Norikazu Fuse (CRIEPI**)
Takahiro Imai (Toshiba Corporation)
**CRIEPI: Central Research Institute of Electric Power Industry

The Technical Committee on Dielectrics and Electrical Insulation (**TC-DEI**) has a long history from 1970, in which the former committee named as the Permanent Committee on Electrical Insulating Materials was established in IEEJ (the Institute of Electrical Engineers in Japan). The TC-DEI has started a new season from June 2013 with a new chairperson of Prof. Y. Tanaka. The activity of the Committee has been covering mainly solid and composite dielectric materials and their technologies.

Organized events by TC-DEI

The important activity of TC-DEI is the annual domestic Symposium on Electrical and Electronic Insulating Materials and Application in Systems (**SEEIMAS**), formerly called Symposium on Electrical Insulating Materials.

The 46th SEEIMAS was held in Kyushu Institute of Technology, Kitakyushu from 3rd to 5th September 2015, with technically cosponsored by IEEE DEIS Japan chapter, CIGRE Japanese national Committee and locally arranged by colleagues of Kyushu Institute of Technology. Totally 80 papers including 3 invited papers were listed in the symposium proceedings. There were 27 oral and 53 poster presentations (including demonstrations). During the conference, 175 participants working with industry, government, and research and academic institutions shared their experiences and discussed the latest developments and future challenges confronting the field. The symposium covered the topics of diagnostic techniques, inverter surge and partial discharge phenomena, biological and organic electronics technology, and space and surface charge phenomena. Especially in this year's symposium, the special session featuring the diagnosis of electrical insulation degradation with demonstration using actual equipment was carried out by supported many manufacturing companies for the diagnostic products. In this demonstration, several PD sources were prepared and the companies' staff actuary showed their detection techniques competitively using their own detective products (Fig. 1). To attend only this attractive event, more than 80 persons visited the symposium site. The event really contributed to increase the number of participants of the symposium. Next year, the 47th SEEIMAS is supposed to be held in Gifu from end of August to beginning of September. The details are not fixed yet.

In every 3 years, we hold SEEIMAS as an international one technically cosponsored by IEEE DEIS, namely the International Symposium on Electrical Insulating Materials (**ISEIM**). Last year, we held the 8th international symposium (**2014 ISEIM**) with Honorary Chair of Prof. M. Nagao and the General Chair of Prof. Y. Tanaka, in June 1-5, 2013 at Toki Messe, Niigata, technically cosponsored by IEEE DEIS, co-sponsored by Niigata University and Waseda University, in cooperation with IEEE DEIS Japan chapter. Next ISEIM is supposed to be held in Toyohashi area in 2017. We are grateful to welcome you to the next ISEIM. Details will be introduced you soon on this magazine.

Investigation Committees run by TC-DEI

Adding to organize some events, the TC-DEI runs Investigation Committees (IC's) that organize

Fig.1 Demonstration for PD detection.

several technical meetings a year. The investigation committees are categorized into three research areas:

New materials including nano-materials related

> Advanced Nanostructure Control for High-Performance Organic Devises and Life Science (07/2014 - 06/2017, Chairperson: K. Kato (Niigata University)).

> Application to the Next-generation Electronics of the Study of Organic Dielectricity and Functionality of Electrical and Electronic Materials in the District of Asia (04/2014 - 03/2017, Chairperson: M. Iwamoto (Tokyo Institute of Technology)).

> Advancing Tailor-made Composite Insulation Materials (07/2015 - 06/2018, Chairperson: T. Tanaka (Waseda University)).

Ageing and diagnosis of electric and electronic equipment related

> Degradation Diagnosis Technology of Electric Power Apparatus for its Transfer (04/2013 - 03/2016, Chairperson: Y. Ehara (Tokyo City University)).

> Testing methods of winding insulation systems for Invertor-fed motors (05/2013 - 04/2016, Chairperson: M. Nagata (University of Hyogo)).

> Current state and future view of innovative diagnostic techniques of power apparatus (10/2012-09/2015, Chairperson: M. Ikeda (Nuclear Regulation Authority)). Next committee is now under consideration.

Basic dielectric and breakdown phenomena related

> Electrical insulation technologies under cryogenic temperature (10/2015 – 09/2018, Chairperson: N. Hayakawa (Nagoya University)).

Electrical Discharges (ED)

Chairperson: Haruaki Akashi (National Defense Academy)
Secretaries: Akiko Kumada (The University of Tokyo)
Hiroshi Kojima (Nagoya University)
Assistant Secretaries: Yasushi Yamano (Saitama University)
Naohiko Shimura (Toshiba Corporation)

The Technical Committee on Electrical Discharge (TC-ED) belongs to the Fundamentals and Materials Society of the IEE Japan. The origin of the TC-ED is the Expert Committee on Electrical Discharges, which was established in January 1954. That is, the TC-ED has supported the development of science and technologies on electrical discharges in Japan for a long time.

The purposes of the TC-ED are mainly the wide promotion of the research activities concerning to a variety of electrical discharges in vacuum, gas, liquid and on surfaces of materials and their applications to high technologies, especially aiming an environmentally sustainable technology for the next generation.

Several investigation committees, which are the affiliates of the TC-ED, are established every year to survey the up-to-date research subjects. The activities of these committees usually continue for three years. Each committee generates very useful technical report at the end of the active period. An investigation committee shown in Table 1 is currently active.

The TC-ED organizes about six domestic technical meetings on electrical discharges every year. In these meetings, nearly 200 papers are presented from both academic and industrial sides. The technical meeting is also useful to train and encourage young researchers including students. The domestic technical meetings are sometimes co-organized by other Technical Committees such as Dielectrics and Electrical Insulation, Pulse Electromagnetic Energy, Plasma Science and Technology, High Voltage Engineering, and Switching and Protecting Engineering.

In order to promote the international activities in electrical discharges, "**21st International Conference on Gas Discharges and Their Applications** (GD2016)" will be held in Nagoya University on September 11 to 16, 2016. TC-ED and other TCs are now working on preparing for the conference.

The TC-ED also contributes to organize an annual young researcher seminar in cooperation with the Institute of Engineers on Electrical Discharges in Japan for encouraging the young researchers in the field of electrical discharges. The seminar consists of lectures by senior researchers, poster presentation by the participants, and the visit tour to the facilities such as research institute. About 40 young researchers and engineers participate in the seminar and discuss vigorously the topics for two days.

Table 1 Investigation Committee in TC-ED.

Chairperson	Research subjects and established time
H. Sugawara (Hokkaido University)	Gas-phase simulation technologies for analyses of electrical discharges and plasmas (established in October 2014)

Pulsed Electromagnetic Energy (PEE)

Chairperson: Sunao Katsuki (Kumamoto University)
Vice-Chairperson: Koichi Takaki (Iwate University)
Secretary: Takashi Kikuchi (Nagaoka University of Technology)
Assistant Secretary: Jun Hasegawa (Tokyo Institute of Technology)

The Technical Committee on Pulsed Electromagnetic Energy (TC-PEE) was founded under the Fundamentals and Materials Society of the IEEJ in June 1999. The activity of TC-PEE covers the collection and spread of information on pulsed power technology and its applications.

Using pulsed power technology, very high power electromagnetic pulses can be produced, which are used for generation of high power electromagnetic waves, high energy photons or high power particle beams. In addition, while huge machines with extremely high output power released in a single shot are developed at the start of the pulsed power technology, many smaller devices equipped with a lot of modulators, which are able to control the pulse waveform accurately by using high speed semiconductor switch elements but possess only the ability of smaller output energy, are now being developed and used in series-parallel connection to attain higher average power in high repetition rate operation. Thus the pulsed power technology becomes to be widely recognized as the basis of many technologies.

Recent activities of TC-PEE

The major activity of TC-PEE is to organize technical meetings and to hold or support international symposiums on pulsed power. In 2015, two technical meetings and an international symposium were held. Both technical meetings were joint with the Technical Committees on Electrical Discharges (TC-ED) and on Plasma Science and Technology (TC-PST), to exchange and share advanced knowledge on discharges, plasmas and pulsed power technology. Also 1st Pacific Symposium on Pulsed Power and Applications was co-organized with Texas Tech University team and held at Maui, Hawaii, USA, to share the cutting edge science and technology on pulsed power.

TC-PEE started a technical investigation committee named "*Recent Development and Industrial Applications of Repetitive Pulsed Power Technology*" in June 2015.

Several meetings including the TC-PEE meetings and the steering committee meetings were often carried out online using a web-based meeting system (WebEx, Cisco Systems).

TC-PEE selects young researchers who make excellent presentations at the technical meetings, for the IEEJ excellent young researcher awards.

Investigation Committee on Recent Development and Industrial Applications of Repetitive Pulsed Power Technology

This Investigation Committee focuses on compact and repetitive pulsed power supplies that are expected to be used for industrial purposes such as water treatment, gas treatment, sterilization, and biological processes. The Committee chaired by Prof. W. Jiang of Nagaoka University of Technology started in June 2015 and its activities will continue for 3 years, including 3 or 4 Committee meetings, 1 officer meeting, and 1 laboratory tour, every year.

The following items will be investigated by this Committee and its members: 1) repetitive pulsed power switching technology, 2) repetitive pulsed power energy storage technology, 3) repetitive pulsed power circuit technology, 4) repetitive pulsed power generator marketing trend, 5) repetitive pulsed power cost performance, 6) repetitive pulsed power application trend, and 7) repetitive pulsed power future prospects.

The Committee members will make efforts to provide a forum for the discussions on the subjects of interest. The goals of the Committee are to overview the state-of-the-art pulse power technology. The committee is planning to publish a Special Issue of IEEJ on repetitive pulse power technology in May 2018.

2015 Pacific Symposium on Pulsed Power and Applications

The 2015 Pacific Symposium on Pulsed Power and Applications was held in Maui, Hawaii, USA, from August 5 to 7, 2015. This symposium was aimed at providing a forum for scientific and technical information exchange between researchers and developers from US, Japan, China, Korea and other countries. It was attended by 50 registrants including attendees from 3 industrial exhibitors. Two parallel oral sessions accommodated 45 presentations, 31 of which were published by IEEJ research reports.

This meeting started 13 years ago as a US-Japan symposium on pulsed power and plasma applications. IEEJ has been technically supporting this meeting from its beginning.

Fig. 1 2015 Pacific Symposium on Pulsed Power and Applications held in Maui, Hawaii.

Reported by
Sunao Katsuki (Kumamoto University)
Weihua Jiang (Nagaoka University of Technology)

Plasma Science and Technology (PST)

Chairperson: Yasunori Tanaka (Kanazawa University)
Secretaries: Masanori Shinohara (Nagasaki University)
Nozomi Takeuchi (Tokyo Institute of Technology)
Assistant Secretaries: Ryuta Ichiki (Oita University)
Takuya Kuwahara (Nippon Institute of Technology)

The Technical Committee on Plasma Science and Technology (TC-PST) in Institute of Electrical Engineers of Japan (IEEJ) was founded in April 1999. This committee is originally based on the plasma researcher's society that had organized technical meetings on plasma science and technology in IEE Japan several times a year since about 30 years ago. The activity field of this committee includes researches and investigations on fundamentals and applications of various plasmas over wide ranges of their density, temperature, ionization degree such as nuclear fusion, plasma processing, and plasma chemistry.

The TC-PST has 18 members from various fields on plasma science and technology in Japan. The major activity of this committee is to organize several technical meetings on plasma science and technology every year. Recent activities are as follows: In 2014, three technical meetings were held, in May at Ashikaga Institute of Technology in Ashikaga, in September at Osaka Prefecture University in Osaka, and in October at Horutohall OITA in Oita. In 2015, we also have three technical meetings in June at Hokkaido University in Sapporo, in September at Hiroshima University in Hiroshima and in October at Kiten Building in JR Kyushu Hotel in Miyazaki. Each meeting usually has 20–40 oral presentations. The oral presentations by young researchers including undergraduate and graduate students are strongly encouraged, and they are nominated for young presentation award. In addition, some of the technical meetings are jointly organized with the technical meetings of Pulse-Power Technology (TC-PPT) and Electrical Discharges (TC-ED). In 2014 and 2015, we have had four joint meetings with them.

Recently, the TC-PST had two investigation committees: "Standardization of Experiment and Simulation: Modeling in Liquid Interface Plasma", and "Propulsion Performance of Electrical Propulsive Rocket Engine and Physical Phenomena in Internal Plasmas". In the committee of the standardization of experiment and simulation: modeling in liquid interface plasma, investigations were made over the characteristics on plasma–water interface, overview and perspectives to activate related research activities in domestic institutes. The investigation results has been summarized and published in a technical report. The other committee, related to the propulsion performance of electrical propulsive

rocket engine and physical phenomena in internal plasmas, investigated the recent progress of the propulsion performance and the understanding of physical phenomena in plasmas. The investigation results are planned to be reported in the technical forum in 2016.

Electrical Wire and Cables (EWC)

Chairperson: Yasuo Suzuoki (Nagoya University)
Secretaries: Kouji Miura (SWCC SHOWA CABLE SYSTEMS Corporation)
Kenichi Furusawa (J-Power Systems Corporation)
Yoshihisa Nagoya (VISCAS Corporation)

Technical Committee on Electrical Wire and Cables (TC-EWC) is a committee organized in the IEEJ Power and Energy Society, and is comprised of members from cable manufacturers, power utilities, railway companies, universities and related research institutes such as Japan Electric Cable Technology Center (JECTEC) and Central Research Institute of Electric Power Industry (CRIEPI).

The technical committee organizes technical meetings to provide an opportunity to present technical achievements and to promote R&D activities in this field. One technical meeting was so far held in 2015, which was on degradation diagnosis and judgement of wires, cables and power apparatuses and was held as a joint meeting of TC-DEI and TC-EWC. The technical committee plans to hold 4 more technical meetings in FY2015, two of which will be jointly organized by TC-DEI and TC-EWC. The topics of the technical meetings will be 'technological trends in transmission and distribution cables and splices', 'insulation technologies of cable systems, treeing, tracking and insulating materials', 'degradation and malfunctions of wire and cables and their countermeasures', and so on.

The technical committee also held a symposium on 'domestic and overseas technical trends in overhead transmission cables and their accessories' and a forum on 'technological history and future tasks of distribution wire and cables'.

In addition to organizing technical meetings, forums and symposia, the technical committee supervises investigation committees dealing with subjects related to electrical wire and cables. During the last several years, investigation committees were organized on the following subjects, i.e. 'technology of XLPE power cables and associated accessories for underground power distribution', 'technical trend of environmental tests for insulation materials of distribution wires and cables', 'recent technological trends in overseas power transmission cables', 'trend of recycling technology for wires and power cables', and 'domestic and overseas technical trends in

Technical visit to SCMAGLEV and Railway Park of Central Japan Railway Company.

overhead transmission cables and their accessories'. The technical report of the second-to-last committee was published in September, 2015. The technical report of the last committee is now under preparation and will be published in 2016. The Investigation Committee for the Status Quo and Problems of Diagnosis and Evaluation Methods for Distribution Wire and Cables is now in action.

The technical committee also organizes a technical visit. This year we visited SCMAGFLEV and Railway Park of Central Japan Railway Company in September, where we enjoyed a lecture on technology of superconducting MAGLEV bullet train and various exhibits of Japanese railway history.

IEC TC112 Japanese National Committee

Chairperson: Hiroya Homma (CRIEPI*)
Vice-chairperson: Hisaaki Kudoh (The University of Tokyo)
Secretaries: Hiroaki Uehara (Kanto Gakuin University)
Associate Secretary: Kenichi Yamazaki (Toshiba)

*CRIEPI: Central Research Institute of Electric Power Industry

IEC TC112 deals with many international standards and specifications on evaluation and qualification of electrical insulating materials and systems. TC112 was established in 2005 based on the part of TC15 and TC98. TC98 and the related sub-group in TC15 were disbanded to the establishment of new technical committee. TC112 Japanese National Committee was also established in 2005 to correspond to the activities in TC112 and to concern with related Japanese standards.

Japanese National Committee ordinary has four meetings in a year and discusses related standards and future activities. Dr. Homma has replaced Dr. Okamoto as the chairperson of the Committee in April 2015.

TC112 involves eight working groups and dealing with more than 53 standards. TC112 Japanese National Committee includes eight corresponding working groups and one more WG that relates with the Japanese Industrial Standards (JIS). Working group structure is shown in Table 1. Three conveners of the eight international WGs are now taken by Japanese, WG2: Dr. Kudoh, WG7: Dr. Okamoto and WG8: Prof. Tanaka. In this reason, Japanese members are very active in this standard region.

In November of 2014, IEC General Meeting was held in Tokyo, and meetings of TC112 were held during the weeks. Figures 1 and 2 show the scenes of plenary meeting of TC112 and the dinner party at a restaurant near the Tokyo Station. Total 40 people, 23 from foreign countries and 17 Japanese, participated to the party and had very pleasant time together. Chairperson of TC112, Mr. Roger Wicks expressed his deep appreciation for the good operations and support by TC112 Japanese National Committee.

Table 1 WG organization of Japanese TC112

WG	Subject
1	Thermal endurance
2	Radiation
3	Electrical Strength
4	Dielectric/Resistive properties
5	Tracking
6	General methods of evaluation of electrical insulation
7	Statistics
8	Various material properties
9	Japanese Industrial standards (JNC only)

After the Tokyo meeting, TC112 meetings were held at Kista, Sweden, from August 31 to September 4, 2015. Recent standards discussed in TC112 are partly listed:

WG1: IEC 60216-7-1: Accelerated determination of relative thermal endurance using analytical test methods (RTEA) - Instructions for calculations based on activation energy.

WG2: IEC/TR 61244-4 (tentative): Effects of radiation under non-ambient environments; Effect of temperature.

WG3: IEC/TS 61934: Electrical insulating materials and systems - Electrical measurement of partial discharges (PD) under short rise time and repetitive voltage impulses.

Prof. Kornhuber (GE) was agreed unanimously as new convener for WG3, as Prof. Stimper's successive convener.

WG4: IEC 62631-2-1: Dielectric and resistive properties of solid insulating materials Part 2-1: Relative Permittivity and dissipation factor – Technical Frequencies (1 – 100 MHz), AC

Methods.

IEC 62631-3-11: Dielectric and resistive properties of solid insulating materials – Part 3-11: Determination of resistive properties (DC Methods) – Volume resistance and volume resistivity, method for impregnation and coating materials.

IEC 62631-3-4: Dielectric and resistive properties of solid insulating materials - Part 3-4 Method of test for electrical resistance and resistivity of insulating materials at elevated temperatures.

WG5: IEC 60112: Method for the determination of the proof and the comparative tracking indices of solid insulating materials.

IEC 60587: Electrical insulating materials used under severe ambient conditions - Test methods for evaluating resistance to tracking and erosion.

WG6: IEC 61857-31: Electrical insulation systems - Procedures for thermal evaluation - Applications with an expected operating life less than 5000-hours.

IEC 61857-32: Electrical insulation systems - Procedures for thermal evaluation - Multifactor evaluation by diagnostic procedures.

IEC 61857-33: Electrical insulation systems - Procedures for thermal evaluation - Multifactor evaluation with increased factors at elevated temperature.

IEC/TS 62332-3: Electrical insulation systems (EIS) - Thermal evaluation of combined liquid and solid components - Part 2: Hermetic Motor-Compressors.

IEC TR 61858-3: Electrical insulation systems - Thermal evaluation of modifications to an established electrical insulation system (EIS) - Part 3: Clarification of major and minor components.

WG7: IEC/TR 60493-3: Guide for the statistical analysis of aging test data part.3: Minimum specimen numbers with given experimental data (tentative title).

WG8: Prof. Tanaka (JP) was agreed unanimously as new convener for WG8, as Prof. Shimizu's successive convener.

Fig. 1 TC112 Plenary Meeting in Tokyo, 2014.

Fig. 2 TC112 Dinner Party in Tokyo, 2014.

RESEARCH ACTIVITIES AND TECHNICAL EXCHANGES IN ASIAN COUNTRIES

Conference Records

17th Asian Conference on Electrical Discharge (ACED 2014)

From December 8th to 9th 2014, the 17th Asian Conference on Electrical Discharge (ACED 2014) was held at Narai Hotel, Bangkok city of Thailand Kingdom. The Chairman of International Steering Committee of ACED 2014 was Prof. Kunihiko Hidaka (The University of Tokyo), and the Chairman of the Executive Committee was Prof. Komson Petcharaks (Chulalongkorn University). ACED 2014 was hosted by the Department of Electrical Engineering, Chulalongkorn University, and co-hosted by Center of Excellence in Electrical Power Technology of Chulalongkorn University (CEPT).

ACED is consisted by 7 countries: Japan, China, Korea, Indonesia, Thailand, Malaysia, Pakistan and Singapore, and the International Steering Committee is operating the conference as the center. The conference is held in each country every two years. This conference is a place for arguments about electrical discharge, high voltage engineering, and the basic and applied research for electric power. The researchers and students from Asian who are active in a wide range of high voltage fields gather and make a presentation about their research achievement, and discussing, exchanging information. The 1st ACED was held in Karatsu city, Saga, Japan in 1988 and it marked this 17th.

In the past ten years, the former Prime Minister of Thailand, Thaksin support group (Symbol color: Red) and Anti - Thaksin group (Symbol color: Yellow) have conflicted on policy, so that the society was getting unstable. A military coup was happened in May 2014, (the last time was in 2006). In the view of the domestic political turmoil and the unstable security, this conference was thought to be stopped temporarily. After that, gathering and demos are forbidden by the martial law. Then the public security of Bangkok is getting better. Because of this, ACED 2014 was planned to restart again. The Steering Committee and the Local Executive Committee called for the papers and hosted the conference. As a result, although there were not many participants compared with usual years, the conference was held with a workshop-like atmosphere, and made an active idea exchange on each speech. The authors want to say thanks from the heart to the professors in the Committee who try their best to operate the conference in this very difficult situation. If to express the feeling of the authors, got very close distance between the members and felt cozy atmosphere in this conference.

ACED 2014's Topic Areas were stated as follows:

1. Elementary processes and transport phenomena of electric charges
2. Corona, spark, surface discharge, high-pressure glow, and high-frequency discharge
3. Lightning discharge phenomena and its measurement
4. Pulsed power source and technology
5. Plasma generation and diagnostic technology
6. Application of electrical discharge and plasma
7. Partial discharge phenomena and measurement
8. Space charge, dielectric measurement and their applications
9. Electromagnetic fields, measurement, and environmental effects
10. Electrical insulation diagnostics, on-line monitoring, measurements, testing techniques and quality assurance
11. Intelligent technology and system in HV engineering
12. Other related issues

In this conference, there gathered total 35 articles (all oral presentations) and the number of participants was 32 (Picture 1). The number of participants in each country was shown in table 1. As table 1 showed, the host country Thailand held the most participants, the next was Japan, and China. From these countries, there were lots of Master and Doctor Course students who participate in.

Picture 1 Picture of the participants of ACED 2014

Table 1 Number of Participants in Each Country

Country	No. of Participants
Thailand	13
Japan	10
China	6
India	2
Laos	1
Total : 32	

The number of articles per session was shown in table 2. Every session gathered mostly equivalent number of articles. In the application of discharge plasma field, chemically active species generated by plasma (radical) was used for fruit sterilization as a unique application example, measurement of active species in the plasma jet, verification of effect of shape and surface roughness of the dielectric used for barrier discharge, a wide variety of report could be heard. In recently plasma application, the use of OH radical which had strong oxidation effect than ozone, was being attention. In addition, in the presentation of high voltage and insulation, water tree of underground cables, effect of nanocomposite, effect of surface charge, discharge between the circuit board and the mold resin, etc., researches on various actual problems were reported. There were lots of common features in these presentations, investigation on the mechanism of the phenomena in micro perspective, from there made a stance to solve the fundamental of the problem. In addition, as a new diagnostic technique for micro observation of discharge plasma was reported. Application in the field of high voltage and insulation diagnosis, the measurement learned from each other, and the seeds of research was born and developed.

Table 2 Number of Articles per Session

No.	Sessions	No. of papers
1	Plasma, Discharges and Applications	4
2	Solid Insulation and Surface Discharge	6
3	Test Techniques and Apparatus	5
4	Transmission and Distribution Systems	5
5	Partial Discharge and Corona Discharge	4
6	Gas, Liquid Insulation	6
7	EMC, Biological Effects	5
Total : 35		

The morning on the first day of the conference, registration was made before the reception. It was a long time since last reunion, the laughter and conversation of the researchers made the reception lively. At the opening ceremony, Prof. David Banjerdpongchai (the Chairman of Electrical Engineering Department in Chulalongkorn University) made an opening declaration of the conference, and then, the Chairman of the Executive Committee, Prof. Komson Petcharaks, the Chairman of International Steering Committee, Prof. Kunihiko Hidaka also made greetings (Picture 2).

Picture 2 Picture of opening ceremony

Because there was no poster session this time, only oral sessions were made all through the days. The conference room was a big room which accommodated 60 people (Picture 3). Presentation was set in 15 minutes and questions answers time was set in 5 minutes. It was very active for the questions, so that every presentation was greatly prolonged for discussion. (Time for the prolonged discussion was almost not enough.) In addition, during the coffee break time, the answer to the question about the presentation was still going on, and pleasant chats were also made.

On the night of the first day, a banquet was held in the hotel where the conference was held (Picture 4). The traditional music and dance in Thailand was shown, and the participants took a lot of fun about it. Also, they were satisfied with their cooking, and the research fellows renewed their friendships. The students who took part in this conference also made friends with each other, and went out together with meal and city sightseeing. On the other hand, during the conference, the students came from Thailand and China were active in question section, compared with other countries, but the students came from Japan were felt reticent. If the Japanese students are reading this report, the authors hope them to use English and make a question and discussion for challenge next time, because it is a precious opportunity of international conference.

Picture 3 Picture of oral session

On the second day, after the oral presentation, the closing ceremony was held. As usual, the ACED will be held in 3 days, this time was also planned to be 3 days. As stated before, because of the domestic unstable politics of Thailand, there were just few articles gathered and the conference became 2 days. On the closing ceremony, the next holding place was introduced. The next ACED is planned to be held in Indian Institute of Technology Madras (IITM) from December 8th to 10th 2016. Everyone who reads this report until the end, please join the ACED 2016!!

Picture 4 Picture of the banquet

Picture 5 Announcement of the next ACED 2016

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21th International Conference on Electrical Engineering (ICEE 2015)

International Conference on Electrical Engineering (ICEE 2015) was successfully held at The University of Hong Kong, Hong Kong from July 5 to 9, 2015.

ICEE is hosted by the Hong Kong Institution of Engineers (HKIE), the Korean Institute of Electrical Engineers (KIEE), the Institute of Electrical Engineers of Japan (IEEJ), and Chinese Society for Electrical Engineering (CSEE). ICEE aims to provide a forum for sharing knowledge, experience and creative ideas among international electrical engineers with focus on Asia, and to contribute to technical development in electrical engineering. The 21th ICEE has been expanded since its first opening in 1995 by Republic of Korea, Japan, China and Hong Kong.

With the theme "*Sustainable Electrical Engineering to Third Industrial Revolution*", ICEE 2015 was well attended by 522 delegates from Hong Kong (174), Japan (162), Korea (120), China (49) , Thailand (10) and some other overseas countries (7) (Table 1). Total 285 technical papers were submitted. There were 307 presentations (Table 2), 6 Keynote speeches, 3 Panel sessions, 1 Special session, 36 Technical sessions, and 6 Poster sessions and 1 Industry session.

In the opening ceremony on July 5, 2015, Ir Prof. Ching Chuen Chan, Conference Chairperson of ICEE 2015 made his greeting speech. After the opening ceremony, 6 keynote speeches were given by Prof. Venkatesh Narayanamurti, Mr Philippe Joubert, Ir Prof. Norman C. Tien, Prof. Masakazu Kato, Mr. Yimin Wang, and Prof . Hyun Kyo Jung. (Table 3, Fig. 1 & 2)

Table 1 Number of participants from each country.

No,	Country	No. of Participants
1	Hong Kong	174
2	Japan	162
3	Korea	120
4	China	49
5	Thailand	10
6	USA	4
7	France The Gambia Russia	1
Total		522

Table 2 Number of presentations.

Sessions	No. of Presentations
Keynote	6
Panel	11
Special	5
Technical	142
Poster	135
Industrial	8

Table 3 Presenters and titles of keynote speeches.

No.	Name of Speaker	Title of Presentation
1	Prof. Venkatesh Narayanamurti (Harvard University, USA)	Bridging the Basic-Applied Dichotomy and the Cycle of Invention and Discovery
2	Mr Philippe Joubert (Global Electricity Initiative)	Global Electricity Initiative
3	Ir Prof. Norman C. Tien (The University of Hong Kong)	Robotic Systems for the 3rd Industrial Revolution
4	Prof. Masakazu Kato (Tokyo Denki University, Japan)	Connectable Maximum Capacity of Wind Power Generation and Its Expanding Method through Cross-regional Operation in Japan
5	Mr. Yimin Wang (State Grid Corporation of China, China)	Global Energy Connection
6	Prof . Hyun Kyo Jung (Seoul National University, Korea)	Global Movement in Developing High Efficiency Motor

Fig. 1 Representatives from each country.

Fig. 2 Photo of the keynote speech.

Fig. 3 Photo of the oral session.

Fig. 4 Photo of the poster session.

Fig. 5 Conference dinner at the Grand Stage, Western Market.

Fig. 6 The flag of ICEE was passed to Prof. Kaneko, the Chairman of ICEE 2016 (right).

The next conference, ICEE 2016 was announced to be held in Okinawa, Japan from July 3-7, 2016. Ir Prof. Ching Chuen Chan, Conference Chair of ICEE 2015, passed the flag of ICEE to Prof. Eiji Kaneko, the Chairman of Local Organizing Committee of ICEE 2016 (Fig.6).

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11th International Conference on the Properties and Applications of Dielectric Materials (ICPADM 2015)

The International Conference on the Properties and Applications of Dielectric Materials (ICPADM) provides a forum for experts in high-voltage insulation and dielectrics to discuss and share ideas, present results, relate experiences, and future projects. ICPADM is an IEEE DEIS-sponsored conference and serves as the main insulation conference for the general Asia-Pacific area. Continuing a series of conferences that began in 1985, the 11th conference was held on July 19–22, 2015, at the University of New South Wales (UNSW) in Sydney, Australia. Dr. T. Phung and Prof. T. Blackburn of UNSW were the general chairpersons and played dominant roles in organizing the conference.

The aim of ICPADM is to combine fundamental research and applications in dielectrics, covering the basic physics and general areas of electrical insulation in power systems, the diagnosis of insulation degradation, and the insulation in HVDC systems. This year, 428 abstracts were submitted, of which 270 from 18 countries were accepted. The number of papers accepted for oral presentation was 136, and they were divided into 21 oral sessions. Their framework of the oral sessions is summarized in Fig. 1. More than half of all the presentations were from China, demonstrating China's momentum in this area of research.

The conference began with opening remarks from Prof. T. Blackburn. This was followed by the Ziyu Liu Memorial Lecture delivered by Professor Li Shengtao, who was a PhD student of Professor Liu and is now the Associate Dean of the School of Electrical Engineering at Xi'an Jiaotong University. He is also the Executive Associate Director of the State Key Laboratory of Electrical Insulation in Power Equipment in China. His lecture focused on charge transport in polymeric materials, the effects of traps, and their links to insulation failure (Fig. 2). The conference organized several plenary presentations from both fundamental and application perspectives. The list of speakers is presented in Table 1.

The technical program of the conference is shown in Table 2. Three types of oral sessions were held in parallel in addition to poster sessions. The conference covered various topics, for example, monitoring and diagnosis, aging and life expectancy, and insulation for EHV AC and HVDC systems were general topic areas of electrical insulation in power systems. The synergistic areas of basic dielectrics and material applications included partial discharges, treeing and surface tracking, electrical conduction and breakdown, nanodielectrics, interfacial phenomena, and space charge characteristics. As shown in Fig. 3, each session room was occupied by an audience. Many participants also attended the poster sessions (Fig. 4), although the thriving atmosphere in the oral sessions appeared to provide a better opportunity for learning.

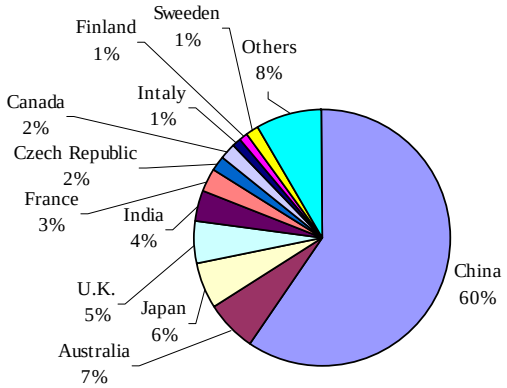

Fig. 1. Presenter framework.

Fig. 2. Prof. Li Shengtao (right) received a gift at the end of his Ziyu Liu Memorial Lecture from Prof. T. Blackburn (left), the general chairperson of the conference.

Table 1. List of invited lectures.

Speaker	Affiliation	Title
Prof. Shengtao Li	Xi'an Jiaotong University	Charge Dynamics: Linking the Trap to Insulation Failure
Prof. Len Dissado	University of Leicester	The Importance of the Electrode Interface
Prof. Gian Carlo Montanari	University of Bologna	Characterizing Insulation Systems of Rotating Machines Controlled by Power Electronics: The Role of Partial Discharges
Prof. Masayuki Nagao	Toyohashi Institute of Technology	Electrical Breakdown of Polymeric Insulating Materials
Prof. Paul Lewin	University of Southampton	High Voltage Insulation System Condition Monitoring: Ensuring Future Smart Grids are Resilient and Reliable

Table 2. Technical program for ICPADM 2015.

July 19th	July 20th				July 21st				July 22nd			
	Opening, PS1				PS2				PS4			
WS1					PS3				PS5			
	O: NN1	O: MD1	O: AL1	P: IE0	O: NN2	O: MD2	O: IE2	P: SC0	O: PD2	O: MD3	O: IE3	Tour
	Lunch				Lunch				Lunch			
WS2	O: SC1	O: BN1	O: IE1	P: AL0	O: SC2	O: MS2	O: AL2	P: MD0	O: CS2	O: BN2	O: AL3	Tour
	O: CS1	O: MS1	O: PD1	P: NN0	Social Event				Closing			
Reception					Banquet							

O: oral session. P: poster session.
PS: plenary session, AL: aging and life assessment, BN: bio-dielectric, eco-friendly dielectrics, and new materials, CS: conduction and breakdown, surface and interfacial phenomena, IE: insulators, insulation in equipment and systems, MD: monitoring and diagnosis, MS: modeling and simulations, NN: nanotechnology and nanodielectrics, PD: partial discharges, SC: space charge

(a)

(b)

Fig. 3. Picture of an oral session.

Fig. 4. Picture of a poster session.

Fig. 5. Picture of a workshop on space charge measurement.

Furthermore, two types of workshops were held during the conference. The first workshop, held in the morning on July 19th, was on the numerical computational modeling of gas discharges, with significant emphasis on coronas, partial discharges, and general breakdown modeling. The lecturer was Dr. R. Morrow, senior principal research scientist at the Commonwealth Scientific and Industrial Research Organization (CISRO). The second workshop focused on space charge measurement using pulsed electro-acoustic methods. The aim of this workshop was to inform participants about the basic theory and practical procedures of space charge measurement. The basic measurement procedure, including calibration, sample preparation, data acquisition, and processing, was discussed on the basis of specification IEC/TS 62758. A picture from the workshop is shown in Fig. 5. The above two workshop topics are similar to the topics of workshops held during the 7th International Symposium on Electrical Insulating Materials, which was held in Niigata, Japan in June 2014. These areas can represent a new wave of methodologies using computers and precision machinery, potentially attracting many researchers.

The conference also provided an opportunity to tour the UNSW Analytical Centre on July 22nd. The center provides major instrumentation for the study of the structure and composition of biological, chemical, and physical materials. The tour covered the entire center, allowing participants to observe the surface analysis facilities, XRD laboratory, Raman spectroscopy laboratory, and electron microscopy unit. The tour agenda is shown in Fig. 6.

Fig. 6. Picture from the technical tour.

The local organizing committee also arranged a social tour to Sydney Opera House and Harbour Dinner Cruise. Attendees of the tour visited the UNESCO World Heritage-listed site to see the iconic landmark. Sydney is consistently ranked among the world's best cities for travelers. The city is also home to many iconic landmarks such as the Harbour Bridge and Darling Harbour. The cruise took participants to these places and served dinner, allowing conference-goers to experience the Australian culture. All the participants and accompanying families had a delightful time filled with friendship and kindness. Some pictures from several social events including lunch time are shown in Fig. 7.

During the conference, the International Advisory Committee convened to review the status of the conference. At the conclusion of the conference, it was announced that the next ICPADM will be held in Xi'an, China in 2018. Xi'an was the site of the 1985 ICPADM; 2018 will be the third time that Xi'an has hosted the conference.

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(a) Lunch time

(b) Tour of the Opera House

(c) Dinner cruise

Fig. 7. Pictures taken during the sightseeing cruise.

Fig. 8. Group photo of all participants of ICPADM 2015.

46th Symposium on Electrical and Electronic Insulating Materials and Applications in Systems (SEEIMAS)

This is a review of the 46th Symposium on Electrical and Electronic Insulating Materials and Applications in Systems (SEEIMAS), which is mainly hosted by Technical Committee on Dielectrics and Electrical Insulation (TC-DEI) in IEEJ. The 46th symposium was held at "Nakamura Centenary Memorial Hall" of Kyushu Institute of Technology in Kitakyushu, Japan from 3rd to 5th Sept., 2015. The SEEIMAS is an annual domestic symposium and the international one is supposed to be held in every three years as International Symposium on Electrical Insulating Materials (ISEIM). This domestic symposium, formerly called Symposium on Electrical Insulating Materials (SEIM), was started in 1968. The founders of this 1st symposium were Prof. Y. Inuishi, Prof. M. Ieda, Prof. K. Yahagi, Dr. T. Nakazima, and so on. Before the start, they attended the Pocono Conference (now it becomes CEIDP) in USA and they wanted to realize the similar conference in Japan to stimulate the activity in the field of dielectrics and electrical insulation technology in Japan through the intensive discussion among university, research institute and industry people. We hold this SEIM every year from 1968 and SEIM greatly contribute Japanese development in this field.

The 46th SEEIMAS was composed of following events:

(A) Dielectric properties and diagnostic techniques (6 oral presentations)

(B) Inverter surge and partial discharge phenomena (6 oral presentations)

(C) Innovative diagnostic techniques of power apparatus (4 oral sessions)

(D) Diagnostic demonstrations (11 demonstrations)

(E) Biological and organic electronics technology (4 oral presentations)

(F) Space and surface charge phenomena (5 oral presentations)

(MVP) Mutual visiting stile poster session (28 poster presentations)

(P) Poster session (5 poster presentations)

(SS) Sun shine session (10 poster presentations)

(M) Memorial lectures (2 lectures)

（I） Invited lecture (1 lecture)

As mentioned above, total 82 papers were included in the symposium proceedings. There were 28 oral (including 3 invited) and 54 poster presentations (including papers for demonstrations). During the conference, 175 participants working with industry, government, and research and academic institutions shared their experiences and discussed the latest developments and future challenges confronting the field. Figure 1 shows a group photo at banquet of the conference.

The conference commenced with opening remarks by Prof. Y. Tanaka of Tokyo City University and General Chair of the symposium. The end of the first day, an invited lecture about structure of power cables and their typical examples of accidents and degradations was provided by Dr. M. Yamada, JECTEC (Japan Electric Cable Technology Center), for young researchers. The second day, Prof. F. Kaneko of Niigata University delivered the 9th Ieda Memorial Lecture. This award is given to a person who has contributed to academic progress of this research field. His presentation consisted of his research carrier on organic electronics. Prof. Y. Ebinuma of Shonan Institute of Technology also delivered the 12th Yahagi Memorial Lecture. This award is given to a person who has contributed to industrial progress of this research field. His presentation consisted of his research carrier on diagnostic technique for electric power cables.

Fig. 1. Group photo at banquet.

Fig. 2. Demonstration for PD detection.

In this symposium, a diagnostic technology was featured theme. The investigation R&D Committee on Current State and Future View of Innovative Diagnostic Techniques of Power Apparatus, chaired by Dr. M. Ikeda of Nuclear Regulatory Agency, organized this attractive special session. In the oral session, a key-note address for the diagnostic technology was presented by the chairperson and following three desirable reports were presented by renowned speakers. In the demonstration, 8 companies and 3 universities presented their diagnostic techniques for detection of partial discharge (PD), cable defects and other accidents. Especially for the PD detection, a demonstrated PD source was prepared, and company's staff actuary showed their detection techniques competitively using their own detective products (Fig.2). To attend only this attractive event, more than 80 persons visited the symposium site. The event really contributed to increase the number of participants of the symposium.

A special poster session called "Mutual Visiting-Type Poster (MVP) Session" was organized in the 38th SEEIMAS (2007) to encourage young researchers to expand their activities. This is one of our most important missions. In this session, young researchers are encouraged to showcase their presentation and research abilities through the poster sessions. Presenters from similar research fields are divided into small groups and are required to give their own poster presentation to the other members of the group. After the short presentations, the other group members question the presenter. All members of the group

Fig. 3. MVP session.

Fig. 4. SS Session.

deliver their presentation in the same way; this allows all participants to engage in meaningful and productive discussions (Fig. 3). Four outstanding presenters were presented with awards during the symposium banquet, and one of them was selected as "the most valuable presentation" award, which enabled the researcher to partake in the Korea-Japan Young Researcher Exchange Program. This award that offers winners financial aid to deliver presentations was inaugurated at this symposium. During this symposium, the award winner in Korea, Mr. Young-Chul Cho of Hoseo University, presented his study as part of this exchange program.

SS (Sun-shine) session was also continuously held in this symposium from 2007. This session was started to promote exchanges between academic and industrial fields in our DEI community. This objective seems to be accomplished through a long experience of the symposiums. Furthermore, some participants from industry could have found out their business opportunity using this session effectively.

Next year, the 47th SEEIMAS is supposed to be held in Gifu City, followed by a young researchers' seminar, from end of August to beginning of September. (Details of schedule for it are not fixed yet.) The next ISEIM would be held in Toyohashi City, Japan in 2017. We are grateful if you participate in the symposium and add some fruitful discussions to the symposium.

Finally, we would like to sincerely thank all of the participants and members of the organizing committee for their contribution to the symposium. We also would like to express our sincere appreciation to all the supporting members of the symposium for their contributions.

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International Conference to be held in Asia

ICEE 2016 (International Conference on Electrical Engineering)

Dates: July 3-7, 2016
Venue: Okinawa Jichikaikan, Okinawa, Japan
Organized by:
The Institute of Electrical Engineers of Japan (IEEJ)
Co-organized by:
Chinese Society for Electrical Engineering (CSEE)
The Korean Institute of Electrical Engineers (KIEE)
The Hong Kong Institution of Engineers (HKIE)
Theme: Future Technology for Bridging Nations
URL: www.okinawa-congre.co.jp/icee2016/

The International Conference on Electrical Engineering (ICEE) aims to provide a premium forum for sharing knowledge, experience and creative ideas among world electrical engineers. Since ICEE the First 1995, it has been successfully held once a year. The IEEJ is pleased to announce ICEE 2016 will be held at Okinawa Jichikaikan, Okinawa, Japan from 3 to 7 July, 2016. It is a great pleasure for the IEEJ and co-organizers KIEE, CSEE, and HKIE to invite potential authors who have significant contributions in electrical engineering fields to submit papers to be referred to the following engineering areas/topics:

- Fundamentals, Materials & Education
- Power Systems & Energy
- Electronics, Information & Control Systems
- Electrical Machines, Power Electronics & Industry Applications
- Sensors & Micro-machines

This time, two types of papers - full papers (6 pages) and short papers (1 or 2 pages) - will be anticipated. The latter ones are based on our new project, and we would like to encourage business personnel or students to submit short ones. As for the full papers, the committee will select and nominate the outstanding full papers for article contribution to JICEE (Journal of International Council on Electrical Engineering).

Important Dates:

Submission of abstract:	Dec. 31, 2015
Acceptance notification of abstract:	Feb. 1, 2016
Submission of full paper:	Apr.1, 2016
Acceptance notification of Paper:	May. 1, 2016
Registration for paper publication & early bird registration:	Jun. 1, 2015

ICEE 2016 Secretariat:
Nippon Seimei Naha Bldg., 3-1-1 Kumoji, Naha City, Okinawa 900-0015 Japan
Tel: +81-98-869-4220, Fax: +81-98-869-4252
E-mail: info-icee2016@okicongre.jp

CMD 2016 (International Conference on Condition Monitoring and Diagnosis)

Dates: September 25-28, 2016
Venue: Empark Grand Hotel, Xi'an, China
Organized by: Xi'an Jiaotong University, China
Supported by:
State Key Laboratory of Electrical Insulation and Power Equipment
China Electrotechnical Society
Chairman:
Prof. Shengtao Li, Xi'an Jiaotong University, China
URL: www.cmd2016.org

The international conference on "Condition Monitoring and Diagnosis 2016 (CMD 2016)" will be held in Empark Grand Hotel, Xi'an during 25-28 September, 2016.

CMD 2016 will be an excellent opportunity for engineers and researchers to present and discuss the latest results in the field of condition monitoring and diagnosis. The general aim of the conference is to make new acquaintance for the participants and to promote the international collaboration on the condition monitoring and diagnosis.

The technical program will consist of papers presented in regular, poster and plenary sessions covering a broad range of areas such as:

- Evaluation of failure and degradation of power equipment based on CMD
- Advanced sensors and diagnosis techniques for Smart Grid
- Strategy planning and asset management for power equipment
- Fusion of Big Data and Smart Grid Control with CMD techniques for power equipment
- Insulation structure design and lifetime assessment for HVDC system
- Degradation and lifetime assessment of new energy devices for power generation and storage

Important Dates:

Abstract submission:	Jan. 11, 2016
Acceptance notification:	Feb. 29, 2016
Manuscript submission:	Apr. 11, 2016
Acceptance of manuscript:	May 16, 2016

CMD 2016 Secretariat:
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ACED 2016 (Asian Conference on Electrical Discharge)

Dates: December 8-10, 2016
Venue: Indian Institute of Technology (IIT) Madras, Chennai, India
Chairperson: Prof. Nilesh J. Vasa, Department of Engineering Design, IIT Madras
Convenor: Prof. R. Sarathi, Department of Electrical Engineering, IIT Madras
Host Organization: IIT Madras
URL: www.ee.iitm.ac.in/ACED2016

The 18th Asian Conference on Electrical Discharge (ACED 2016) will be held at IIT Madras, Chennai, India, during 8-10 December 2016. This is the 18th conference of a series that had its last venues in Bangkok, Thailand (2014), Johor Bahru, Malaysia (2012), Xi'an, China (2010), Bandung, Indonesia (2008), Hokkaido, Japan (2006), Shenzhen, China (2004), Seoul, Korea (2002), Kyoto, Japan (2000), Bandung, Indonesia (1998), Bangkok, Thailand (1996), Xi'an, China (1994), Oita, Japan (1993) and Singapore (1992).

The initiative of this conference is to form a forum for researchers, scientists and engineers to discuss and deliberate the cutting edge research activities in the areas of recent progress in properties, phenomena and applications of electrical discharges. The organizing committee cordially invites you to participate in the conference. Original papers on the following topics, but not limited to, are welcome to be submitted.

- Elementary processes and transport phenomena of electric charges
- Corona, spark, surface discharge, high-pressure glow, and high-frequency discharge
- Lightning discharge phenomena and its measurement
- Pulsed power source and technology
- Plasma generation and diagnostic technology
- Application of electrical discharge and plasma
- Partial discharge phenomena and measurement
- Space charge, dielectric measurement and their applications
- Electromagnetic fields, measurement, and environmental effects
- Electrical insulation diagnostics, on-line monitoring, measurements, testing techniques and quality assurance
- Intelligent technology and system in high voltage engineering
- Other related issues

Important Dates:

Submission of abstract:	May 30, 2016
Acceptance notification of abstract:	Jul. 15, 2016
Submission of full paper:	Sep. 1, 2016
Acceptance notification of paper:	Oct. 15, 2016
Registration for the conference:	Nov. 1, 2016

ACED 2016 Secretariat:
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China Corner

Progress of Power Grids Construction in China

Prof. Shengtao Li
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1. Overall

China is now at a critical period of rapid economic growth; its electricity demand will continue to increase quickly. However, comparing with the vast land area, the mismatch between energy bases and load centers in China is significant. Additionally, wind, solar, and other emerging energy resources are also mainly located in the west and north. Therefore, it has to be developed at a faster pace to enable the intensive development of large energy bases and reliable delivery of electricity, and to adapt to the needs of securely integrating and efficiently accommodating bulk clean energies. These increase the requirements of the capabilities of grids to transfer massive energy over long distance and to accommodate intermittent clean energy.

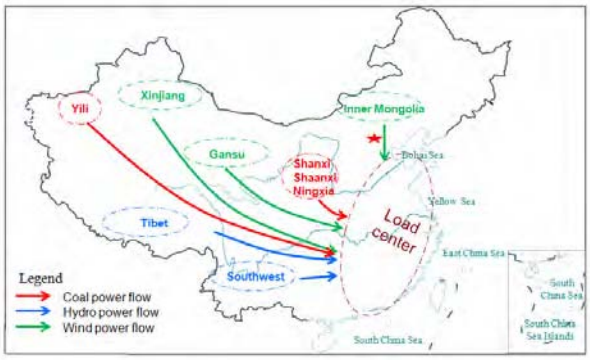

Figure 1 Energy bases and load centers in China

The rapid increase of power demands and the uneven distribution of energy bases and load demands in China require long-distance power transmission. Lots of achievements have been made during the power grid construction. For example, the transmission system operates under higher voltage level, greater transmission power and lower line loss. At the same time, the existing power grid structures have been strengthened to build the Strong Smart Grid. The power grid construction under high altitude has developed rapidly. On the other hand, the capacity, security and reliability of electric equipment have been developed vigorously.

2. Power Grid Construction Project

2.1 The first ±1100kV UHV DC Project

On July 7 2015, a kick-off meeting for the preliminary design of Zhundong-Wannan ±1100kV UHV DC project was held in Beijing, which marks the UHVDC project entered into the preparation stage of construction officially. It is a demonstration project with the highest voltage level, the largest transmission capacity, the longest transmission distance and the most technical innovation in the world.

The project is rated ±1100kV, 12GW, which will be new world records of the operating voltage level and transmission capacity. The transmission distance is 3340 km. Resulting of the long distance, if these links are designed at ±800kV then the line loss will exceed 10%. Therefore, ±1100kV classes has a very important practical significance to decrease the power loss while increasing the capacity of a single line. The transmission line starts from Wucaiwan converter station in Xinjiang and ends at Wannan converter station in Anhui. The power loss of ±1100kV DC links is 5.34% - 5.88%, and the energy loss calculated based on annual 5500h is 3.7% - 4.1%.

Figure 2 Zhundong-Wannan ±1100kV UHV DC transmission project

The ±1100kV UHV DC technology can further increase the economic transmission distance and transmission capacity of UHV DC systems, and it makes full use of UHV grid's capability of optimizing allocation of energy resources by efficient bulk power delivery over larger areas, thus facilitating substantial breakthroughs in electrotechnology and innovations in equipment manufacturing technology. All the study results of 750- and 1000-kV AC grids provide a basis for the development of ±1100kV UHV DC transmission technology.

2.2 Power Transmission Projects under High Altitude

In order to improve the stability and reliability of power grid and continually enhance capabilities of the grid for optimal allocation of energy resources, it is necessary to connect the regional power grid together. However, due to the complex geographical conditions of Tibetan Plateau and the high altitude (low air pressure) characteristics, it is extremely difficult to connect the Qinghai power grid, Tibet power grid and the south part of Sichuan power grid.

The Qinghai-Tibet power grid connection engineering started work construction completely on July 29, 2010; it

was put into operation at the end of 2011. It starts from Xining substation in Qinghai and ends at Lhasa converter station in Tibet. It consists of two parts. One part is the Xining-Qaidam 750 kV AC transmission with a distance of 1492 km and the other part is Qaidam-Lhasa ±400kV DC transmission with a distance of 1038 km. Along the transmission lines, the average altitude is 4500 meters, with the highest elevation 5300 meters and the transmission distance operating above 4000 meters is more than 900 km. The construction of the project fundamentally solves the problem of power shortage in Tibet, and optimizes the distribution of energy resources in Qinghai at the same time.

The transmission links between Sichuan and Tibet power grid were put into construction on Nov 20, 2014, marking that the Changdu prefecture in Tibet power Grid will operate independently no longer. It is another power transmission project through the high altitude area, which also is the world's most difficult power transmission and transformation construction projects so far. The transmission line is 1521 km long. In the project, two 500-kV transformer substations and two 220-kV transformer substations will be constructed. It will solve the electricity demand of more than 1.45 million people in Tibet and Sichuan. It locates in the hinterland of Sichuan-Tibet plateau, operating in high altitude area. Complicated technology challenges and engineering construction difficulties will be solved.

Figure 3 The diagram of Qinghai-Tibet and Sichuan-Tibet transmission lines

At the same time, it will be a clean energy delivery channel beneficial to local hydropower development. The developable waterpower resource is more than 41 GW, equaling to two times of TGP (Three Gorges Project) hydroelectric station, while only 5.5GW has been developed currently. With the operation of follow-up power station in Changdu, the electric power can be transported through this project. After the operation of Sichuan-Tibet transmission project, the security and stability of southwest China grid will be further improved to fully meet the requirement of guidelines on security and stability. Moreover, this will help improve Sichuan and Tibet's self-development capability, guaranteeing the coordinated development between social economy and environment.

3. Key Techniques in UHV Transmission Engineering

3.1 UHV AC Step-up Transformer

During the construction of the UHV AC project, major technical difficulties were solved for system security and stability control, and a series of standards, codes, and specifications were established. This way, UHV AC transmission technologies were fully mastered and used to guide grid development in China, with overall capabilities surpassing those of Europe, the United States, Japan, and other developed countries.

Figure 4 1000kV/1000MVA UHV step-up transformer

UHV step-up transformer has promising prospects in China. Connecting power plants to the UHV system through UHV step-up transformer could avoid short-circuit current overstress on the 500-kV side and help increase the transmission distance and suppress voltage fluctuation. As show in figure 4, it was the 1000kV/1000MVA UHV step-up transformer manufactured by China XD Group. It is the first 1000kV/1000MVA transformer with double-column structure of the world. The key technique indexes, including insulation resistance, partial discharge, temperature rise and noise control reached international advanced level. In addition, it provided a good foundation for the further development of 1000kV/1500MVA UHV step-up transformer with three-column structure.

3.2 UHV DC Converter Transformer

UHV DC transmission projects are diversified in configuration, operating mode, and other aspects. By performing groundbreaking work on the overvoltage, insulation coordination, external insulation, and performance of key equipment, China has made several innovations.

In June 2013, the Standardization Administration of the People' Republic of China approved the application of China Electricity Council for building an "international standardization innovation and demonstration base" for a 3-year term (2013-2015) in SGCC. Up to now, full technologies for the design, construction, test, operation, and maintenance of UHV projects have been independently developed.

Figure 5 shows the development of a converter transformer for ±800kV UHV DC applications. In the Xiangjiaba-Shanghai project, the converter transformer has its highest voltage at 800kV (DC) on its valve side

Figure 5 ±800kV converter transformer

and 500kV (AC) on its line side. To withstand such high voltages, the converter transformers are subject to complicated electric, magnetic, thermal, and mechanical stresses, and their overall dimensions are constrained because of transportation conditions. Through the development, the following breakthroughs have been made.

1) Difficulties in insulation design were solved.
2) Valve side bushing and exit leads were developed.
3) The connection scheme of regulating windings were optimized.
4) Difficulties in partial discharge control were solved.
5) Difficulties in leakage flux, harmonic, and temperature increase control were solved.
6) The converter transformer's line side and valve side windings were all wound by special transposed conductors.
7) The active part was compact and the insulation structure was well-designed according to the distribution of AC and DC electric fields and the properties of insulating materials.

3.3 The first ±800kV/6250A UHV converter valve

On July 10 2015, the world's first ±800kV/6250A UHV DC converter valve passed the regular test, type test and special test successfully. It was designed and developed by the intelligent institute of state grid in China. Compared with the ±800/5000A UHV DC converter valve, it will improve the transport capacity by 25%, enhancing the transport efficiency and saving the cost greatly. The 6-inch thyristors and converter valves were developed. The UHV valve tower structure shielding electrode and air clearance are optimized.

The converter valve has overcome the reduction of electrical loss under large current and the challenges of heat rejection for electronic components with high capacity. A novel design of the valve tower cooling water loop has been developed. Also, the resistance to electromagnetic interference of the equipment has been enhanced, improving the reliability and stability of the UHV DC transmission system. It is a major achievements of China in the field of UHV DC transmission.

Based on the remarkable achievements already made in UHV AC and UHV DC engineering, China is making more innovations in developing the ±1100kV UHV DC transmission system and connecting UHV DC systems to UHV AC systems.

4. Conclusions

The rapid development of China and the mismatch between energy and load centers drive China to develop UHV transmission. There are many advantages of UHV transmission: large capacity, long distance, corridor saving, low power loss and high efficiency. China has successfully developed UHV AC and DC technology. Main equipment with the world leading level has been independently designed and manufactured, such as UHV transformer, reactor, GIS, arrester, bushing, and so on. At the same time, design platforms and test facilities have been established.

Several UHV projects have been put into operation and are under construction. Long-term plan to build UHV grid has been drawn up, aiming at building a power grid satisfying the requirement of safety, economy, reliability, and environment protection. Up to now, 7 UHV projects have been put into operation, including 3 UHV AC and 4 UHV DC. This shows that China is the first and the most successful country in practical application of UHV technology, representing the highest level in the field of the world.

In 2015, 6 UHV AC and 8 UHVDC transmission projects will start construction by State Grid Corporation of China (SGCC). Among these projects, 3 UHV AC and 1 UHV DC transmission projects will be completed and put into operation in 2016, and 1 UHV AC and 4 UHVDC projects will be put into operation in 2017. By 2020, more than 14 UHV DC transmission lines will operate in China, including 13 ±800kV UHV DC and 1 ±1100kV UHV DC transmission lines.

It is of great significance to strengthen the research level of electrical insulation issues in the UHV transmission systems. At the same time, the new challenges of power grid security and stability posed by the construction of smart power grid should be considered.

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Korea Corner

Super Grid between China and Korea

Prof. Yong Joo Kim
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1. Introduction

The European super grid which interconnects the various European countries with HVDC power grid is expected to promise the revolutionary future of the electric energy society.

In addition the European super grid comprehensively studied by Dr. Gregor Czish (Kassel University) is aiming at providing the greater market opportunity to the industries as well as the benefits to the electric power consumers as explained in below.

- lower the cost of power in all participating countries, and reduce the margin of inefficient spinning reserve and standby;

  Especially the renewable energy such as a wind power and a solar power are the key units to be connected to the conventional power grid with a smart grid scheme.
- allow for wider use of renewable energy and wide sharing of the total European hydro power resource

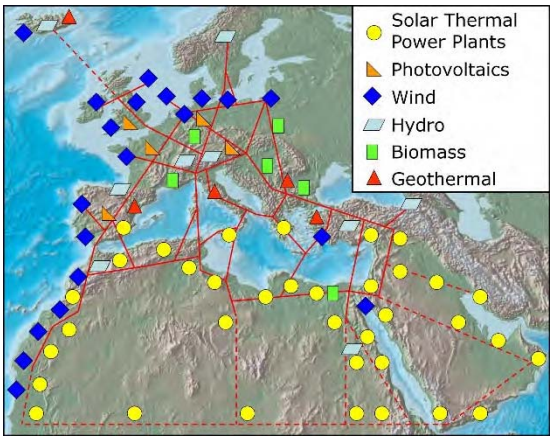

Fig.1 Conceptual Plan of a European Super Grid

2. Super Grid between China and Korea

In NEA (North Eastern Asia) region, the driving force to interconnect the power grid among the region has not been so strong. In the region, the renewable energy resources as well as the natural energy resources are scarce. Particularly for Korea and Japan, the most of natural energy resources are imported from the foreign countries. Furthermore, the tragic accident in Fukushima Nuclear Power Plant in 2011 has brought the turmoil impact to Japan in setting up the emergency policy to secure energy resources.

Fig.2 Feasible Super Grid in the NEA

On the other hand Russia is rich in natural gas resource and Western China Region is abundant in renewable energy resources. And Mongolia is also rich in renewable energy resources. However North Korea is the only barrier to interconnect the various energy resources in this region.

Fig. 3 Proposed Super Grid between China and Korea

The pre-feasibility proposal, as shown in Fig.3, explains Super Grid between China and Korea. The total distance between Shanxi and Incheon is about 1,250 km. The length of overhead transmission line is about 900 km and the remaining line length of 350 km is interconnected via DC submarine cable of 500 kV. The proposed nuclear power units of 2.8 GW are one of the options to supply the produced power to China, Korea and Japan, which indicates the power flow direction from China to Japan. The estimated construction cost is about $ 8 billion. The benefits of Super Grid to NEA countries are listed as follows.

- alleviate the difference of seasonal power peak demand as well as the daily power peak demand; therefore reduce the margin of inefficient spinning reserve and standby
- lower the gap of electricity prices between China and Japan, and then provide the cost benefits to both countries

- stimulate the industrial cooperation and loosen the political tension in NEA countries

Fig.4 Electricity Prices in NEA countries

3. Recent Activities Aiming at NEA Super Grid

The meeting between China (CSEE) and Korea (KIEE) to promote "The pre-feasibility study on Super Grid between China and Korea" will be arranged in Seoul during HVDC 2015 Conference, Oct. 18-22. In addition the international R&D cooperation in nuclear power plant and HVDC project will be discussed as well. On the other hand, MOTIE (Ministry of Trade, Industry and Energy) has promoted the long term R&D project (2016-2021, $150 M) to develop HVDC VSC system. Besides the R&D project, KEPCO is now planning to assist the development program of HVDC submarine cable focused on the feasible application to Super Grid project between China and Korea.

In the projects mentioned above, the importance of high voltage technologies was extremely emphasized to deliver the final commercial products to the targeted global market.

4. Migration from Smart Grid to Super Grid

Last ten years, Korean government and the electric power industry have led the development program for Smart Grid business. The relevant R&D project, investing about $200 M (2009-2013) had promoted the so called "Jeju Test Bed" in five areas- Smart Power Grid, Smart Green Home, Smart Renewable, Smart Transport and Smart Power Market.

However, the forced policy of low electricity price and the fixed electricity price without adopting demand response scheme have prevented the developed technologies through "Jeju Test Bed" project from penetrating into Korean electric power market.

In this context, KEPCO (Korea Electric Power Company) and the leading manufacturers of electric power apparatus have initiated HVDC business in Korea. In 2013, Alstom and KEPCO have agreed to set up the joint company –KAPES (KEPCO Alstom Power Electronics Systems) - to develop the current source type HVDC system. And starting from 2015, the company is now taking the second step to produce the VSC type HVDC system.

The Super Grid project between China and Korea is the first step to interconnect the Asian Super Grid as shown in Fig.4. Author is absolutely confident that this pioneering step would stimulate the promotion of Super Grid project between Korea and Japan.

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Indonesia Corner

Transferring Electric Power from Jawa to Bali using Submarine Cables

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**** PT PLN (State Electric Power Company), Indonesia**

Prof. Suwarno

Ir. Sumaryadi MSc

Figure 1 : Electric power system zoning in Indonesia

1. Introduction

Indonesia is the world's largest archipelago country. It located in tropical area which is situated around the equator. It consists of 17,508 islands, about 6,000 of which are inhabited.

One of the current problems of the country is how to provide sufficient electricity to all citizens in all nation areas including at the remote regions. With the current population of 257 millions and annual growth of 1 % the current generating capacity of Indonesian electric power system is 46 GW, 35 GW in Java-Bali system and 11 GW in Sumatra and Eastern Indonesia system. The capacity is far than sufficient to bolster the economic growth and to electrify all areas in the country. The total of national capacity will increase to 90 GW in 2019 according to National Electric Power Provision Plan[1]. In 2014 the annual electricity production was 198.6 TWh and in 2015 it is expected to increase by 10 % to 218.8 TWh.

Currently, the number of electricity consumers is about 57 millions which consist of 53 million residential, 2.5 millions business, 1.4 million public services and 0.6 million industries. Indonesian national electrification average is 84 %. This means that there are still several tens of millions peoples without electricity. They live in remote area or under developed small islands. This figure increases from 70 % in 2011 and 80.5 % in 2012. There are 78.609 counties in Indonesia and 75.477 of them are already electrified. Observing the distribution of regional electrification there are electrification of with 84.5 % for Sumatra, 87 % for Java-Bali system and 73 % for Eastern Indonesia system.

2 Java-Bali electric power system

In the nation electricity system, Jawa-Bali islands are the most electrified area since more than half of the country population are settled here. The installed capacity of electric power generation in Jawa- Bali system is 35 GW with steam power 59 %, Gas 30.5 %, geothermal 3.3 %, hydropower 6.9 % and the rest are diesel power plants. Among the capacity, PLN (State owned electric power company) contributes 83 % and the rest of 17 % is supplied by independent power plants.

Some of submarine cables connecting islands in Indonesia are Jawa-Madura islands with 150 kV AC cables and Jaw- Bali islands also with 150 kV AC. In forthcoming years there will be another submarine cables connecting islands in Indonesia namely Jawa-Sumatra Islands interconnection using bipolar 500 kV DC with transfer capacity of 3000 MW, Sumatra-Bangka Island with 150 kV AC, Batam-Bintan islands also with 150 kV AC submarine cables. The interconnection of electric power system among islands will bring the system to be more efficient since the electricity can be generated in islands which rich of primary energy resources like Sumatra island and then the electric energy transmitted to highly loaded islands like Java and Bali system.

To transmit the 35 GW electric power in Java-Bali system the extra high voltage transmission of 500 kV is used as the back bone combined with transmission at 150 kV and 70 kV levels with tiers system. Currently, the length of the 500 kV transmission line is 5200 kmc while for 150 kV and 70 kV are 14.000 and 3250 kmc respectively. While the peak load is 24 GW.

Figure 2 : Submarine Cables connecting Jawa and Bali islands.

3. Submarine cable connected Java Island and Bali Island

Bali is an island near Java island. It is internationally renowned tourist and cultural destination. In 2014 the annual tourists visit Bali was 3.76 million. The tourism activities contribute about 6% of the national gross domestic product of Indonesia. Furthermore, Bali tourism generates 67% of Bali's gross regional domestic product, and about 70% of the island's residents are directly or indirectly dependent on the tourist industry. About 46% of the total electricity consumption in Bali is in the commercial sector, which includes the hotel industry and associated services.[2]

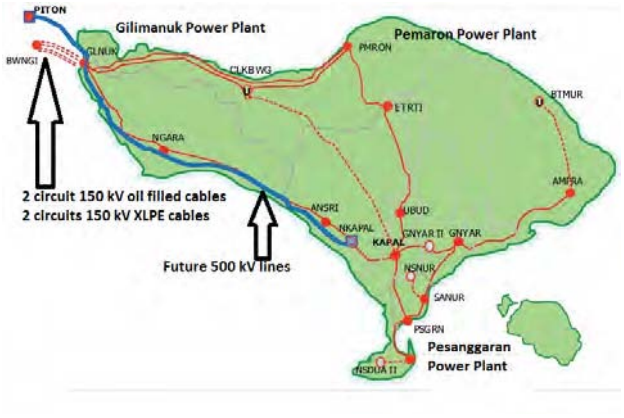
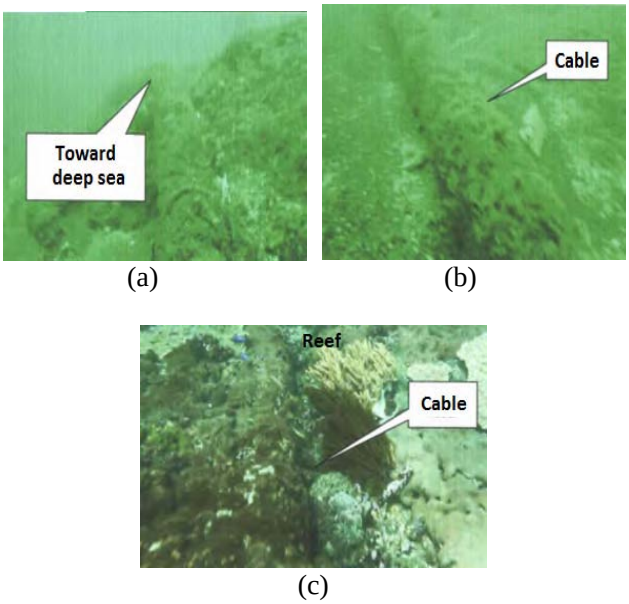


Figure 3 : Electric power system in Bali island

Total load in Bali is about 850 MW with load growth of 9-11 % . The load is supplied by four thermal power plants at Gilimanuk (130 MW), Pemaron (136 MW), Pesanggaran (230 MW) and new coal power plant at Celukan Bawang comersial operation on August, 2015 (3x130 MW). Since the existing generating stations in the island are not sufficient to electrify Bali then the rest power is supplied from Jawa Island through submarine cables cable from Ketapang at Java island side to Gilimanuk at Bali island side. There are 4 circuits submarine cables connecting Jawa and Bali islands with maximum transfer capacity of 440 MW.

There are 2 oil filled cables with length of 4.5 km with copper conductors of 3 x 300 mm2 with each transfer capacity of 130 MVA at continous current per cable 500 A. The cables are laid undersea at the depth of 800 m below sea level and started to operate in March 2000. In addition in June, 2014, 4.2 km length, 2 circuit submarine cables are in operating with XLPE insulation and copper conductors with similar current capacity at 700 m below sea level across the Bali strait. There is a study to provide electricity to Bali from Paiton Generating station at Jawa island using 500 kV overhead transmission lines crossover the Jawa-Bali strait (blue line in figure 3).



(a) (b)

(c)

Figure 4: Jawa-Bali submarine cable used rock dumping (a) on the sea bottom (b) from shallow to deep sea (c) Reef growing around submarine cables

4. Problems in operating the submarine cables

The first 150 kV oil filled submarine cables were operated between Jawa and Bali in 1987. However, some years later the cables failed. In March 2000 new 2 circuits of 150 kV oil filled cables started to operate. However, currently the oil leakages take place at the oil filled cables although they are in operation to transmit electric energy from Jawa to Bali. The oil pressure reduced to 420 kPa from minimum operating pressure of 450 kPa. In order to keep the oil pressure normally, about 5 liters oil has to be added daily at Jawa Island side and 2.8 liters at Bali Island side. Meanwhile, the real problem of the oil leakage is under investigation [3]. During operation location of oil leakages in cables mostly at laydown areas in the beach of both side. Some of pictures relate with the oil leakage are shown in figure 5.

In additional to the 2 circuits oil filled cables, there are 2 circuits XLPE submarine cables connecting Jawa and Bali. Since the beginning of operation in June 2014, all the XLPE the cables are in normal operating condition.

(a)

(b)

(c)

Figure 5 : (a) Cable termination at Ketapang (Java side) , (b) Oil leakage on cable at laydown area and (c) sand containing oil.

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[2] ADB. 2012. Country Operations Business Plan: Indonesia, 2013–2014. Manila
[3] PLN Internal report, 2015

MISCELLANEOUS

Photos on Front and Rear Covers

Front Cover

Geostationary Meteorological Satellites " Himawari-8/-9"

Equipped with next-generation weather monitoring sensors, they will help make weather forecasts more precise.

Geostationary meteorological satellites help make weather forecasts more precise and contribute to the surveillance of the global environment, assisting with weather forecasts and typhoon and severe rain warnings, and monitoring phenomena such as global warming and yellow sand. Satellites equipped with next-generation weather monitoring sensors can realize improvement in resolution, shortening the amount of time required for observation. Owing to the design in consideration of charging and discharging phenomena in insulating materials, the elaborate electronic equipments operate without failure in the geostationary orbit under severe radiation environment. Himawari-8 began operation in 2015 by the Japan Meteorological Agency, and Himawari-9 will be launched in 2016. “Himawari” is the Japanese name of the sunflower. The copyrights of the cover picture are owned by Mitsubishi Electric Corporation.

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Rear Cover

Space charge measurement application for space environment

This picture introduces the PEA system for radiation and the results.

Many dielectric materials (polyimide and fluorine materials) are used for spacecraft surface as a thermal control material as a MLI (multilayer insulator) and OSR (optical solar reflector).

In space environment, Electron and protons, which have an energy gradient, are trapped on the terrestrial magnetism. Therefore, spacecraft are always exposed by those high energy charged particles. Those electrons and the protons are injected into the bulk of the surface dielectric materials, and then they are accumulated in bulk of them. The charge accumulations in dielectric materials sometimes generate a large difference of electric potential with other materials. Such potential difference makes an electro-static discharge (ESD) on the surface of the materials. The discharge sometimes causes the serious damage for the electric devices and wire harness of electric power transmission from PV array. In the worst case, those phenomena are related to fatal error for operation anomaly.

Therefore, we have to study the insulation characteristic of dielectric materials irradiated by charged particle to improve the reliability of spacecraft. From the reason, our research group has developed space charge distribution measurement system using PEA (pulsed electroacoustic) method for radiation. The developed sensor unit’s photo is shown in the middle position of whole picture. As this system has an irradiation window on the top side electrode unit, the charged particle can be lead to the sample.

The results of space charge distribution in polyimide during electron and proton irradiation are shown in the figure which is located top area of whole picture. You can see the same polarity of charge accumulation in the bulk with the irradiation particle polarity, respectively.

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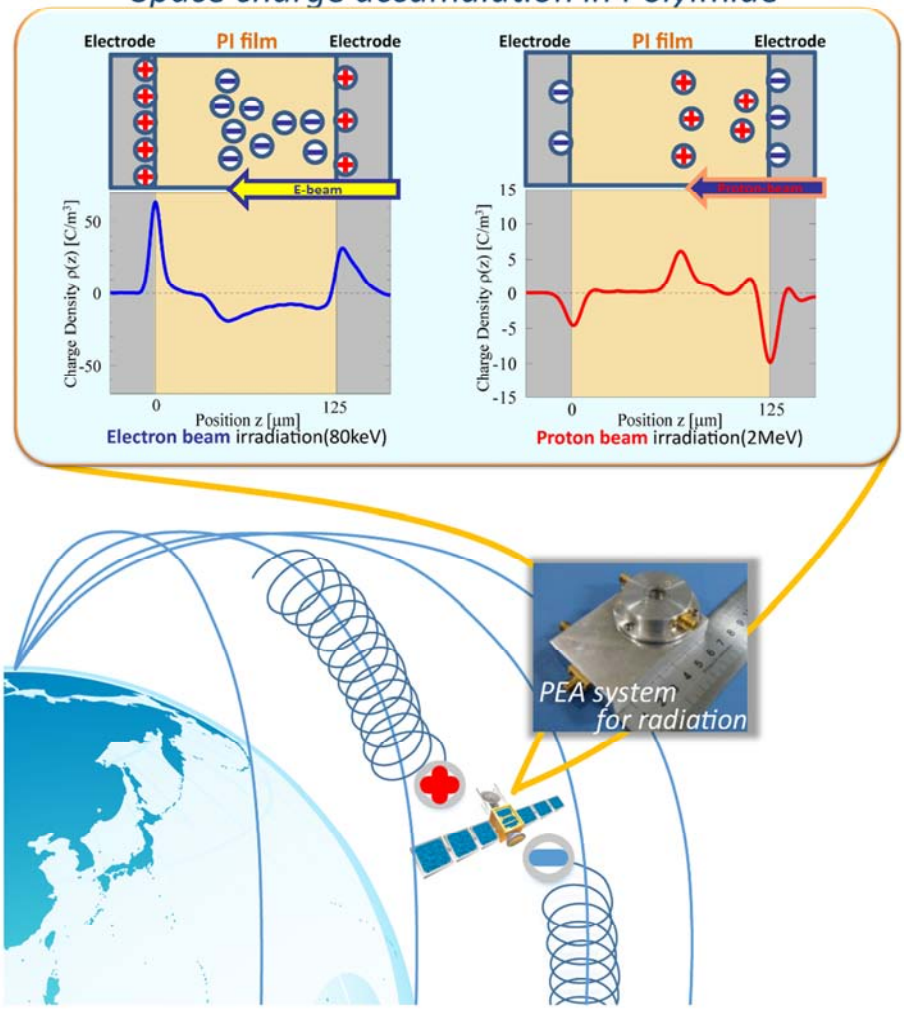

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