

Commission E (Electromagnetic Noise and Interference) Activity Report

December 2015 - May 2016

Commission E in Japan is holding technical meetings and sub-committee activities in collaboration with the Technical Committee on Electromagnetic Compatibility (EMCJ) of the Institute of Electronics, Information and Communication Engineers (IEICE), the Technical Committee on Electromagnetic Compatibility of the Institute of Electrical Engineers of Japan (IEEJ-EMC), IEEE EMC Society Japan Joint Chapter and Sendai Chapter, and some related technical groups.

Domestic academic activities of EMCJ and IEEJ-EMC:

1. Regular Meetings

The EMCJ of IEICE had five regular technical meetings and IEEJ-EMC had two technical meetings in the period of December 2015 to May 2016. The December meeting was held as a co-organized meeting of EMCJ and IEEJ-EMC. In the EMCJ meetings, 67 regular reports and six special talks were presented, while 8 regular papers were presented as IEEJ-EMC. The total number of presentations is 80.

The featuring technical topic of the December and May meetings was “Power Electronics EMC”, which has been attracting strong attention in accordance with recent advances of power electronics devices, and its application to distributed power supply and electric vehicles, etc. The featuring topics in January meeting was “Communication EMC, and Wireless Power Transmission”, co-organized by the Technical Committee on Wireless Power Transfer (WPT). The extending spectrum of power electronics noise and its control in the context of extending high-speed wireless system, and techniques to support coexistence of power systems and communication systems and sensor network systems is very important topics in EMC recently. The meeting in May was also supported and technical co-sponsored by IEEJ Technical Committee on Semiconductor Power Converter.

(<http://www.ieice.org/ken/program/index.php?instsoc=IEICE-B&tgid=IEICE-EMCJ>)

These six special talks listed below were presented in the EMCJ meetings of this period.

[Special Talks]

- (1) Masahiro Yamaguchi (Tohoku Univ.), "RF IC Chip Level Low Noise Technology for Mobile Telecommunication System by Means of Magnetic Materials", Dec. 2015..
- (2) Junzo Ooe (TOYOTA MOTOR CORP.), “Progress of the vehicle EMC, and the future prospects”, Dec. 2015..
- (3) Junji Miyakoshi (Kyoto University), "Safety of Radiofrequency Electromagnetic Fields - International Assessment and Future -", Jan. 2016.
- (4) Yoshio Kami (UEC), "EMC Engineering Course for Company Engineers - Approach at the Gigabit Consortium of the Center for Industrial and Governmental Relations -", March 2016.

- (5) Yoshiyuki Yoshimura, Hirokazu Sugiura, Yuji Yonezawa, Naotaka Kato (IRII), Satoshi Yagitani (Kanazawa Univ.), “EMC and electromagnetic wave technologies in Ishikawa Prefecture”, Apr. 2016.
- (6) Keiji Wada (TMU), Hideki Ayano (Tokyo College), Satoshi Ogasawara (Hokkaido Univ.), Toshihisa Shimizu (TMU), “Research Trends of EMC for Power Electronics”, May 2016.

2. Activity of sub-committees of IEEJ-EMC

In addition to the four sub-committees already active, (1) - (4), the committee on EMC in IEEJ has been organizing the fifth dedicated research sub-committee on “EMC problems of automotive (PHEV/EV)” to realize the effective activity, and the first meeting was held in May 2016.

- (1) Investigation committee on EMC problem of smart grid and city.
- (2) Investigation committee on disturbance of transient electromagnetic fields to electronic equipment and wireless communications.
- (3) Investigation committee on technical trends in evaluation of human exposure to electromagnetic fields.
- (4) Investigation committee on the health risk analysis of electromagnetic field.
- (5) Investigation committee on EMC problem of automotive (PHEV / EV).

The purpose of this new sub-committee is to give a perspective of solutions on EMC problems in automotive applications, particularly in the plug-in hybrid electric vehicles (PHEVs) and EVs, through the investigation into standardization trend related to automotive technology. It also is planning to create a new direction of EMC design in automotive environment with accumulation and utilization of basic technical data,

IEEJ Technical Committee on EMC:

Chairperson: Ken Kawamata (Tohoku Gakuin University)
 Secretaries: Tomoo Ushio (Osaka University), Hidenori Sekiguchi (NMRI)
 Assistant Secretaries: Yu-ichi Hayashi (Tohoku Gakuin University)

EMCJ Technical Committee:

Chairperson: Hideaki Sone (Tohoku University)
 Vice Chairperson: Osami Wada (Kyoto University)
 Secretary: Yoshitaka Toyota (Okayama Univ.), Hideki Osaka (Hitachi)
 Assistant Secretaries: Atsuhiko Takahashi (Toyota Central R&D Labs.),
 Yoshiki Kayano (Akita Univ.), Yusaku Katsube (Hitachi)

Workshops and Symposiums on Natural Electromagnetic Noise:

Four international meetings and two domestic meetings were listed where our committee members were organized/presented the scientific results. Some detailed information on these meeting are provided below.

International:

1. AGU (American Geophysical Union) Fall Meeting”, 14-18 Dec, 2015, San Francisco, USA.

(<http://fallmeeting.agu.org/2015/>)

This is the largest meeting in the field of Earth and space science in the world. Nearly 24,000 people attended in this meeting. 16 papers were presented in the field of atmospheric electricity, signal processing and seismo-electromagnetics by our members. The related sessions are:

- (1) Thunderstorm Effects in the Near-Earth Space Environment
- (2) The Meteorology and Climatology of Lightning and General Contributions
- (3) Enabling Access to Solar and Planetary Resources through the Virtual Observatory
- (4) Seismology without Seismometers: Ionospheric Monitoring of Natural Hazards of Earth, Ocean, and Atmosphere
- (5) Advances in Ionospheric Measurements and Modeling
- (6) Interdisciplinary Study of Pre-earthquake Processes: Observation, Modeling, and Forecasting
- (7) The Meteorology and Climatology of Lightning I

2. EGU (European Geosciences Union) General Assembly 2016”, 17-22 April, 2016, Vienna, Austria. (<http://www.egu2016.eu>)

This is one of the largest meetings in the field of Geophysics. More than 13, 000 scientists from 109 countries were attended. Four papers were presented in the field of lightning and seismo-eletcromagnetic by our members. The related sessions are:

- (1) Atmospheric Electricity, Thunderstorms, Lightning and their effects Short-term Earthquakes Forecast (StEF) and multi-parametric time-Dependent
- (2) Assessment of Seismic Hazard (t-DASH)

3. JpGU (Japan Geoscience Union) Meeting 2016”, May 22nd - 26th, Makuhari Messe, Chiba, Japan. (http://www.jpгу.org/meeting_2016/greeting.html)

This is the largest geophysics meeting in Japan. 24 were presented in the field of atmospheric electricity and seismo-electromagnetics by our members. Related sessions are:

- (1) Atmospheric Electricity
- (2) Electromagnetic phenomena associated with seismic and volcanic activities
- (3) Open Research Data and Interoperable Science Infrastructures for Earth & Planetary Sciences
- (4) Earth and Planetary satellite observation projects Part II: Satellite Earth Environment Observation
- (5) Monitoring and prediction of natural disasters using new methodologies
- (6) Physics and Chemistry in the Atmosphere and Ionosphere
- (7) High performance computing of next generation weather, climate, and environmental sciences using K
- (8) New frontiers in earthquake statistics, physics-based earthquake forecasting, and earthquake model testing
- (9) Geohazards in humid, tectonically active countries and their precursors
- (10) Interdisciplinary studies on pre-earthquake processes

4. IWEP3 (3rd International Workshop on Earthquake Preparation Process) 27-28 May, Chiba, Japan.

(<http://www-es.s.chiba-u.ac.jp/geoph/ulf/iwep3/>)

This is the third international meetings regarding seismo-electromagnetics held in Chiba university organized by one of our members. Twenty-eight oral papers and 15 poster papers were presented in this conference.

Domestic:

1. 94th Annual Meeting of Society of Atmospheric Electricity of Japan, 8-9 Jan, Tokyo (<http://www.saej.jp/>)

This is the largest domestic annual meeting regarding the field of atmospheric electricity in Japan Hundred seven people attended and totally 78 paper were presented during two days. The meeting was held in the University of Electro-Communications. Among them 45 papers were related to the natural electromagnetic noise in the sessions such as lightning, electromagnetic waves and seismo-electromagnetics.

2. 2016 Spring meeting of Meteorological society of Japan, 18-21 May, Tokyo (<http://www.metsoc.jp/>)

Special session regarding understanding and application of lightning discharges were held first time in this largest meeting in the field of meteorology in Japan. More than 100 people attended. Three papers were presented by our members regarding phased array radar, lightning observations from international space station, and total lightning.

International Workshop and Symposiums on EMC:

1. “7th Asia-Pacific International Symposium on Electromagnetic Compatibility & Signal Integrity and Technical Exhibition (APEMC2016)”, May 18-21, 2016, Shenzhen, China; (<http://www.apemc.org/>)

APEMC 2016 was technically co-sponsored by IEEE EMC Society. About 400 papers were presented in regular technical sessions, 14 special sessions, 8 workshops, 8 tutorials, and 4 topical mini-symposiums, which include 19 invited papers, 4 plenary talks, 2 keynote speeches, and one luncheon talk. Some of the papers were submitted as “one page abstract papers” which will not be published in IEEE Xplore. Titles of the topical mini-symposiums are “Integrated Circuit (IC) EMC”, “Wireless Power Transfer Technologies”, “Smart Grid & Power Electronics EMC”, and “Biomedical Electromagnetics”.

Next APEMC in 2017 will be held in Seoul, Korea, and APEMC 2018 is planned to be held in Singapore as a Joint IEEE EMC & APEMC Symposium.

Future International Conferences and Meetings:

1. “EMC Joint Workshop 2016 Taipei (EMCJ WS 2016, Taipei)”, June 2-3, National Taiwan University, Taipei, Taiwan. (<http://www.ieice.org/cs/emcj/jpn/regular/emcj-ws.html>)

The second EMCJ WS will be held in Taipei. This series of EMCJ-WS was started last year as “once a year” regular EMCJ technical meeting outside Japan. The purpose is to encourage young engineers and researchers in Japan and East Asian area to present their works in English and to exchange information in international environment. Technical visit, laboratory tour, is also prepared.

2. “2016 IEEE International Symposium on Electromagnetic Compatibility (EMC 2016)”, July 25-29, 2016, Ottawa, Canada; (<http://www.emc2016.emcss.org/>)
3. “International Symposium and Exhibition on Electromagnetic Compatibility (EMC Europe 2016)”, September 5-9, 2016, Wroclaw, Poland; (www.emceurope.org/2016) Final paper submission: May 16, 2016.
4. “AOGS (Asia Oceania Geosciences Society) 13th Annual Meeting”, 31 Jul to 5 Aug, 2016 Beijing, China (<http://www.asiaoceania.org/aogs2016/public.asp?page=home.htm>) Abstract submission deadline: 19 Feb., 2016.
5. “41st COSPAR Scientific Assembly”, 30 July - 7 Aug. 2016, Istanbul, Turkey (<https://www.cospar-assembly.org/>) Abstract submission deadline: 12 Feb., 2016.
6. “2016 URSI Asia-Pacific Radio Science Conference (URSI AP-RASC’16)”, August 21 to 25, 2016 in Seoul, Korea. (http://aprasc2016.org/Welcome_Message.php)