

## Commission E (Electromagnetic Noise and Interference) Activity Report

April 2014 - July 2014

### Domestic academic activities:

The Technical Committee on Electromagnetic Compatibility (EMCJ) of the Institute of Electronics, Information and Communication Engineers (IEICE) had four regular technical meetings in the period of April to July 2014 where 28 regular reports and three special talks were presented. In May the International Symposium “EMC’14/Tokyo” was held, and hence there was no domestic EMCJ meeting. The featuring technical topics for the regular EMCJ meetings were “Antennas and Propagation” in April, “PCB, Information Security” in June, and “Discharge, Electronic Packaging” in July. The first regular meeting in July was the annual “EMCJ Young Researchers’ Presentation Meeting” (<http://www.ieice.org/cs/emcj/jpn/events/wakate/>) co-sponsored by the Technical Committee on Electromagnetic Characteristics (TC-EM) of Japan Institute of Electronics Packaging (JIEP), where 9 reports were presented.

“Special Talks” presented in April, June and July meetings were as follows.

- (1) Yoshishige Yoshikawa (Panasonic), "Expansion of Wireless Communications for Social Infrastructure and Their Technologies -- Development of Low-Power Radio Systems for Machine-to-Machine Communications --".
- (2) Mitsuo Yokokawa (Kobe Univ.), "On the occasion of completion of the K computer development project".
- (3) Ryoji Yoshino (Environmental Research Office), "About various activities related to electromagnetic environmental engineering in Architectural Institute of Japan".  
( <http://www.ieice.org/ken/program/index.php?instsoc=IEICE-B&tgid=IEICE-EMCJ> )

### International Symposium:

1. “2014 International Symposium on Electromagnetic Compatibility, Tokyo (EMC’14/Tokyo)”.

May 12<sup>th</sup> to 16<sup>th</sup>, 2014, at "Hitotsubashi Hall (National Center of Sciences)", Tokyo.

(<http://www.ieice.org/~emc14/>)

This symposium is the 7th event of the series of EMC Symposium, which was started in 1984 in Tokyo and has been held every five years in Japan, celebrating its 30th anniversary this time. It was organized by IEICE Technical Committee on Electromagnetic Compatibility (EMCJ), sponsored by IEICE Communications Society. The symposium was technically co-sponsored by the IEEE Electromagnetic Compatibility Society (EMC-S) and the Technical Committee on EMC of the Institute of Electrical Engineers of Japan (IEEJ). It was also technically cooperated by 15 national and international organizations related to academic and standardization activities on electromagnetic compatibility, including URSI. The Organizing Committee of EMC’14/Tokyo was formed under IEICE-CS, with the chairperson Prof. Masao Taki (Tokyo Metropolitan Univ.) and vice chairperson Prof. Osami Wada (Kyoto Univ.).

Totally 510 persons, including 18 invited attendees, 54 students, and 21 accompanying persons, from 26 countries attended the symposium. Attendees consisted of 339 persons from Japan and 171 persons from foreign countries. Total of 246 papers, that are 125 papers from Japan and 121 papers from foreign countries, were presented. Technical program of EMC’14 consists of regular sessions, organized sessions, workshops, and tutorial sessions. We note that approximately 1/2 of presented papers were from foreign countries. The proceedings of EMC’14/Tokyo include 218 original papers in total in 28 regular sessions and 17 organized sessions. These papers and additional 28 presentations for workshops and tutorial sessions were presented in four parallel sessions. The technical topics and the number of papers and presentations in each session are listed in Table 1.

For regular sessions, 172 papers were submitted from 24 countries, and 117 papers were accepted. For the organized sessions, 101 original papers were accepted. All the papers, except for two in regular sessions and two in organized session papers which were accepted but not presented at the symposium, will be included in the "IEICE Proceedings Archives", the "IEICE Knowledge Discovery (I-Discover)", and the "IEEE Xplore", based on the agreement between IEICE and IEEE.

Seventeen special topics were selected for organized sessions. In the preparation of the technical program of this symposium, we arranged four of the organized sessions as "Joint Workshops / Organized Sessions" which include original papers and some presentations related to the special topics, which could help attendees to get overviews of the recent trends and latest information.

The specific topics in EMC'14/Tokyo are "Biological Effect and Safety" (16.5 % of regular sessions and organized sessions papers) and "PCB and Device Level EMC" (15.6 %), though "EMI/EMC Measurement Technology" (17.0 %) has been the largest portion of the topics. In particular, IC and chip level EMC issues have become a focus of research. "Power System EMC" is another important topic with increase of papers related to Wireless Power Transfer.

Table 1: Session Topics and Number of Papers in EMC'14/Tokyo

"Technical Fields" (RS, OS, WS/TU)	Regular Session Papers		Organized Sessions and Workshop/Tutorial		
	Session Topics	RS	Session Topics	OS	WS/ TU
Biological Effect and Safety (22, 14, 0)	Biological Effects, EMF Safety & EMC in Medical Applications and Safety	18	Recent Trends of Standardization Activities and Evaluation Techniques for the Electromagnetic Exposure to the Human Body	7	
	Numerical Modeling/ Biological Effects	4	Active Implantable Medical Device EMI	7	
PCB and Device Level EMC (19, 15, 6)	Chip, Package, PCB & Cables	19	Signal Integrity and Unintentional EM Radiation Related to Printed Circuit Boards	7	
			3D-IC and Packages	6	
			IC Chip Level EMC for Telecommunication	2	3
EMI/EMC Measurement Technology (18, 19, 12)	EMC Management and Standards	4	[Tutorial]: Recent Topics of EMC Standardization - Role of ACEC		7
			Improving the Measurement Uncertainty of EMI Testing	8	
			Metrological Approach for Result Validation and Improvement of Measurement Quality	6	
			Photonics-applied Electromagnetic Measurement		5
Power System EMC (10, 14, 7)	High Power & High Voltage EMC	5	EMC Topics Related to Smart Grid	7	1
			Power System EMC (EMC Aspects of Wireless Power Transfer Systems)	4	6
Power Electronics & Vehicles (8, 7, 1)	Power Electronics & Vehicles	8	Automotive EMC	7	1
			Aerospace EMC(0, 5, 0)		
Numerical Modeling (14, 10, 0)	Numerical Modeling	14	Computational Techniques, Modeling, and Simulation for Electromagnetics	6	
			GPU Computing-based Acceleration of Electromagnetic Simulation	4	
EM Absorber and Shielding (11, 0, 0)	Shielding, Grounding & Materials	11			
Immunity, ESD and Transient (8, 4, 0)	Immunity / Susceptibility, ESD and Transients	8	Electromagnetic Noise Radiation and EMI Effects Caused by ESD	4	
Communication System EMC (7, 0, 0)	Communication System EMC	7			
EM Information Leakage (0, 6, 0)			EM Information Leakage	6	
Earthquake Prediction (0, 7, 0)			Electromagnetic Phenomena Associated with Earthquakes: Earthquake Prediction	7	
Lightning (0, 0, 5)			Recent Lightning Current Data from Instrumented Towers		5
	Sum	117	Sum	101	28

RS=Regular Session, OS=Organized Session, WS=Workshop, TU=Tutorial

A Plenary Session was organized under the title of “New Horizon of EMC Research”, and two talks below were given.

- “A New Paradigm in ICT and the Role of EMC Research” by Dr. Masao Sakauchi, National Institute of Information and Communications Technology, Japan.
- “EMC Applications of Electromagnetic Time Reversal” by Dr. Farhad Rachidi, Swiss Federal Institute of Technology, Switzerland

There also was a Keynote Session titled “Overview of EMC Research Trends”, and the following three talks were given.

- “EMC Research Trends in the USA” by Dr. Robert Scully, NASA, President of IEEE EMC Society, USA.
- “EMC Research Trends in Europe” by Prof. Marcello D’Amore, Sapienza University of Rome, Italy.
- “Overview of EMC Related Issues in Japan and Vicinity” by Prof. Liuji R. Koga, Okayama University, Japan.

Future International Conferences and Meetings:

1. “2014 International Symposium on EMC”, August 3-8, 2014, Raleigh, NC USA. (<http://www.emc2014.org/>).
2. “EMC Europe 2014”, Sept. 1-4, 2014, Gothenburg, Sweden. ([www.emceurope2014.org](http://www.emceurope2014.org))
3. "Asia-Pacific International Symposium on Electromagnetic Compatibility (APEMC 2015)", May 26-29, 2015, Taipei, Taiwan. (<http://www.apemc2015.org/>) ; Special Session Submission: Sept. 1, 2014; Preliminary paper submission: Nov. 1, 2014; Final Paper Submission: Feb. 15, 2015.