IEEE TC 5: High Power Electromagnetics (HPEM)
New Orleans Convention Center
Wednesday, 24 July 2019 (12:00 – 1:30 pm)

Confirmed Minutes

1) **Opening of the meeting – Bill Radasky, Chairman**

Chairman Dr. William (Bill) Radasky brought the meeting to order at 12:00 Noon. Dr. Radasky welcomed the attendees, reviewed the agenda and asked for suggested changes; none were offered. Dr. Radasky made a motion to approve the agenda. Motion Seconded and Carried (MSC).

2) **Review and approval of minutes of previous TC 5 meeting – Bill Radasky**

The unconfirmed minutes from TC 5 meeting in Long Beach on 1 August 2018 were reviewed and approved without any changes.

3) **TC 5 membership list update – All**

The TC 5 membership list over the past 5 years was reviewed and a signup sheet was passed around for the attendees this year. We indicated that we like to keep 5 years of attendance, as many people are interested, but cannot attend each year. Also we do not publish the detailed 5-year list on the website, as there may be private information contained in it. The website provides information only for the officers of TC 5 to allow them to contact the membership. Only the officers' and subcommittee chairs' email addresses are revealed on the website, and this procedure has been approved by the IEEE according to the new European privacy law.

The updated attendance list was shown at the meeting and new members will be added to the list.

4) **Report on the paper review process for Long Beach – Bill Radasky**

Radasky reviewed the paper review process for New Orleans and also the tutorials and special sessions presented. There were 12 regular and special session papers submitted, and 10 were accepted. There was one abstract paper, which was accepted. Overall 11 papers for TC 5 were accepted. The review process ran well, and the problems with the review system of the past were not repeated as the TAC made an effort to improve the review schedule.

There was a special session on ESD organized by Khazhinsky (with 2 best paper nominations for the conference), and two tutorials (1 on ESD and 1 on Information Leakage).

5) **Report from the Lightning Subcommittee – Marcos Rubinstein and Farhad Rachidi**

A comprehensive report was provided covering lightning conferences and other activities already held and planned for 2019 and also for 2020.

A review of lightning standardization work was presented indicating that there is a great deal of activity in CIGRE Study Committee C4 (8 WGs) and a new standard in the IEEE PES dealing with the performance of overhead lines.

In addition an update was provided regarding recent news from the Säntis Tower Lightning Research Facility. A new high speed camera and an interferometer were added to the facility in preparation for a laser lightning triggering experimental campaign for the European project LLR.

A lightning video link was provided at: https://www.youtube.com/watch?v=lakaE-fKQf4 . This video shows a lightning flash that occurred on June 18, 2019 at 19:58 local time. The recorded segment lasts 200 ms and was captured using a Phantom high-speed camera located about 4 km north of the tower. The frame rate is 10,000 frames per seconds. The captured flash is an upward negative lightning involving different channels and a number of interesting lightning processes, including several return strokes, M-components, mixed mode charge transfer mode pulses, and continuous currents. The lightning current, which was simultaneously measured at the tower, is also shown along with the high-speed video images.

In closing the presenters recommended that a special session on lightning be organized for the IEEE EMC & SIPI in Reno and/or EUROEM 2020 in Hamburg.

6) **Report from the EM Information Leakage Subcommittee – Yuichi Hayashi**

Hayashi provided a presentation summarizing a special session he had organized for the combined EMC Sapporo/APEMC Conference in June 2019 dealing with security degradation in the presence of low-power IEMI (7 papers). He also reviewed the tutorial that is scheduled for Friday at the New Orleans EMC Symposium dealing with Information Security Countermeasures and Education (6 papers).

He also provided a graphic that showed the activities in Information Leakage worldwide since 2009. It provided an interesting perspective about this field of work.

Finally he recommended a special session in Reno in 2020, dealing with measurement techniques for EM information security.

7) **Report from the IEMI Subcommittee – Frank Sabath**

Frank Sabath did not attend the TC 5 meeting, but provided a written report after the meeting was over. The details below cover his late report.

The report reviewed the activities in the field of IEMI in 2018 including 4 conferences that dealt with the subject. There were also conferences held and planned dealing with IEMI in 2019 including APEMC in Sapporo, IEEE EMC in New Orleans, EMC Europe, and ASIAEM.

It was also mentioned that a new EU research program to train 15 early-stage researchers working on their PhDs in the field was initiated, focusing on EMI risk management.

As for plans for the IEEE EMC Conference in Reno, the report suggested a tutorial on IEMI risk management and a special session on IEMI. It was also suggested that both a special session and a workshop at EMC Europe in Rome in September 2019 could be held.

8) **Report from ESD Subcommittee – Michael Khazhinsky**

Khazhinsky presented his briefing on the ESD subcommittee. He reported on current 2019 activities, beginning with the Wednesday afternoon ESD tutorial session covering system-level ESD protection and testing and he mentioned a special session also dealing with system-level ESD protection was held on Tuesday.

In addition he mentioned several activities in 2019 involving the coordination of the ESD Association (ESDA) and the annual EOS/ESD conference. For 2020 he hoped that IEEE EMC authors would present some papers at the annual EOS/ESD conference in September, and he further indicated that he would propose a special session on ESD for the IEEE EMC Reno conference in 2020.

9) **Coordination with SC-1, Smart Grid – Bill Radasky**

Radasky commented that TC 5 is keeping track of any issues involving Smart Grid, and both the Chair and the Vice Chair of TC 5 have been attending the SC 1 meetings for many years. Radasky mentioned that part of the Smart Grid work in the U.S. is actively considering HEMP and IEMI as special environments to be considered for the future, as there is concern that the planned high-speed communications systems for the power grid may actually increase the vulnerability of the grid to high power EM transients in the future.

10) **TC 5 web page – Mike McInerney, Vice Chairman**

McInerney mentioned the changes to the IEEE EMC website, and indicated that we have updated the TC 5 page through the Webmaster in the past. A new procedure has been provided where each set of technical committee officers can make website updates for their committees. This will be our plan for the future.

11) **Review of HPEM activities since last TC 5 meeting – Bill Radasky**

Radasky indicated that 2019 was a very active year for HPEM in the U.S. and especially for the topic of HEMP and GMD. He presented a list of recent openly available publications (either written or published in 2019), which are listed here:

- William R. Graham, "Chairman's Report: Commission to Assess the Threat to the United States from Electromagnetic Pulse (EMP) Attack," EMP Commission, July 2017.
- "Recommended E3 HEMP Heave Electric Field Waveform for the Critical Infrastructures," EMP Commission, July 2017
- Thomas S. Popik, George H. Baker and William R. Harris, "Electric Reliability Standards for Solar Geomagnetic Disturbances," EMP Commission, July 2017.
- John G. Kappenman and William A. Radasky, "Examination of NERC GMD Standards and Validation of Ground Models and Geo-Electric Fields," EMP Commission, July 2017.
- "Electromagnetic Pulse (EMP) Protection and Resilience Guidelines for Critical Infrastructure and Equipment," DHS/NCC, 5 February 2019.
- Donald J. Trump, "Executive Order on Coordinating National Resilience to Electromagnetic Pulses," March 26, 2019.

There was also mention of commercial power system work in Norway to harden high voltage substations to the effects of HEMP using IEC standards.

12) **TC 5 Sessions at EMC Symposium 2020, Reno - All**

The recommendations for tutorials and special sessions were collected from the 4 subcommittees and all of the four subcommittees planned on either a special session or tutorial in Reno: Lightning, IEMI, ESD and EM Information Leakage.

13) **Update on aircraft lightning direct strike standardization - All**

We have had discussions in recent years whether TC 5 should support a new IEEE standard dealing with direct attachment of lightning to aircraft. Since lightning is in the scope of TC 5, and we have lightning experts in TC 5, we are amenable to supporting such a standard. No additional information was provided at this meeting by Fred Heather, so no action was taken.

14) **Nominations and vote for Officers of TC 5 - All**

As TC 5 uses a 3-year officer term for stability, this year we needed to nominate and vote for 3-year term of officers serving from 1 January 2020 until 31 December 2022. This item was identified on the agenda and sent to all members before the meeting. The current officers agreed to stand for re-election, and the current chair asked if there were additional nominations, and there were not. A vote was taken, and the current officers were re-elected: Chair-Bill Radasky, Vice Chair-Mike McInerney, Secretary-Pina Dall'Armi-Stoks.

15) **Any other business - All**

Prof. Garbe mentioned that the IEEE EMC Society is beginning a new journal that should be of interest to those working in the field of HPEM. IEEE Letters on Electromagnetic Compatibility Practice and Applications (L-EMCPA) is a quarterly published letter journal that provides a rigorously peer-reviewed forum for rapid publication of 4 page letters describing practice, lessons learned and applications of the disciplines electromagnetic compatibility (EMC) and signal and power integrity (SIPI) as well as all relevant methods to predict, assess and prevent electromagnetic interference (EMI) and increase device/product immunity.

16) **Adjournment**

The meeting was adjourned at 1:30 pm.