



**IEEE TC 5: High Power Electromagnetics (HPEM) Technical Committee**

**Minutes of Grand Rapids Hybrid Meeting  
Wednesday, 2 August 2023 (Noon – 1:30 PM Eastern Daylight U.S. Time)**

**Confirmed Minutes**

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

Chairman Dr. William (Bill) Radasky brought the meeting to order at 12:10 PM, Eastern Daylight Time. It is noted that this was a hybrid meeting with 19 individuals attending in person and 2 individuals attending virtually (we started 30 minutes before the meeting to set up the virtual system, and it took 40 minutes to get it done with the help of a local expert). The Chairman, Bill Radasky, the Vice Chairman, Mike McInerney and the Secretary, Yuichi Hayashi were all present. Radasky welcomed the attendees, reviewed the agenda and asked for suggested changes; none were offered. McInerney 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, Chairman**

The unconfirmed minutes from the Spokane TC 5 meeting on 3 August 2022 were approved without any changes. They are attached to these minutes and will separately be placed on the TC 5 web page.

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

The TC 5 membership list covering the past 5 years was reviewed. The previous membership list was displayed without email addresses, and it was noted that several attendees during the past 2 virtual meetings do not have email addresses known. Thus it will not be possible to reach them by email. We had 21 attendees at this meeting with 19 in person and 2 virtual. We do not publish the detailed (with email addresses) 5-year list on the website or in the minutes, as there may be private information contained in it. Only the officers' and subcommittee chairs' email addresses are published on the website, and this procedure has been approved by the IEEE.

**4) Report on the paper review process and sessions for Grand Rapids – Bill Radasky**

Radasky reviewed the paper review process for this Grand Rapids conference and also the tutorial that was presented. There were 10 regular and 5 abstract papers submitted; 15 were

accepted. We ended up with an all-day session on Thursday for the TC 5 papers. There were some problems in assigning session chairs due to limitations in the software being used. In addition, we tried to assign each grouping of papers in the session with a subtitle, but that also did not work due to the limitations in the software. Once all of the papers were put into 1 very long session, it was not possible to assign subtitles or different session chairs for the “sub-sessions”. We complained about the process and the TAC promised this would be fixed for the next year. The papers presented covered the topics of HEMP, EM Information Leakage, IEMI, and ESD. There were no lightning papers.

We had a sufficient number of reviewers this year, and they should be recognized for their hard work. The reviewers were: Homma, Khazhinsky, McNerney, Sabath, Savage, Thomas and Willemen.

A tutorial was presented on Wednesday afternoon:

- WE-PM-G: Wednesday, 2 August 2023
  - Recent Advancements in HEMP, EMP, and IEMI Protection – A Global Perspective
  - Organizers: Tara Kellogg and Chaouki Kasmi
  - Presentations by: Chaouki Kasmi, Sergio Longoria, Ryan Marietta, Frank Sabath

It is especially notable that 3 papers submitted for this conference were nominated for best EMC Paper and/or best EMC Student paper. The papers are:

1. Best EMC Paper Finalist: “Early-time Electromagnetic Pulse Response Validation of Surge Arrester Models,” by Tyler Bowman, Thomas Kmiecik, Laura Biedermann
2. Best EMC Paper and Best EMC Student Paper Finalist: “Reconstruction of Sound Information Leakage Signals Obtained from Multiple Demodulation Methods,” Taiki Kitazawa, Seiya Takano, Yuichi Hayashi
3. Best EMC Student Paper Finalist: “Failure Mechanisms Analysis in GaN HEMTs under High-Power Microwave Pulses,” Yue Zhang, Liang Zhou

While none of the papers was selected as the Best Paper, Paper 2 above was given an honorable mention for the Best Student Paper.

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

A presentation audio/visual presentation was prepared by Marcos Rubinstein and Farhad Rachidi. Marcos prerecorded his voice while presenting the charts. The charts are attached, but the audio/visual presentation is a very large file that cannot be included with these minutes. The conferences and other events planned and held thus far in 2023 were discussed along with the events planned for 2024. Also 9 WGs in CIGRE Study Committee C4 currently working were identified during the presentation. One WG in IEEE PES was also mentioned. In addition, other lightning activities were summarized. Radasky thanked the Lightning Subcommittee for providing a comprehensive report.

Further details can be found on this agenda item in the Attachments.

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

Yuichi Hayashi provided his report beginning with an overview of the 5 regular papers submitted and presented at this year's conference. He also reviewed the special session to be presented at EMC Europe this year (8 papers) and a workshop on Tempest (with 5 talks). He also mentioned the activities that they have supported in the IEEE Digital Privacy Initiative.

Hayashi mentioned that from 20-24 May 2024, APEMC and Japan's EMC2024 Conferences will be combined in Okinawa, Japan and there will definitely be coverage of EM Information Leakage at this symposium. Of course all EMC researchers are welcome to submit papers and attend. Radasky mentioned that TC 5 should plan on a meeting at this conference, as we have on occasion met in Asia (Singapore for APEMC) and at EMC Europe (Dresden for EMC Europe). This gives regional engineers an opportunity to attend a TC 5 meeting when it is difficult for them to attend the meetings in the U.S. Hayashi indicated that he will carry this proposal forward to the conference organizers.

Prof. Hayashi was complemented on his efforts to provide a complete review of activities in the EM Leakage area, worldwide.

Further details can be found on this agenda item in the Attachment.

7) **Report from the HEMP/IEMI Subcommittee – Mike McInerney**

Mike McInerney presented the HEMP/IEMI report in two parts. For the HEMP aspects, Bill Radasky provided a summary of HEMP activities (which have continued since 2021) including:

- The U.S. Department of Energy has published an open document to specify recommended HEMP waveforms to use to evaluate the vulnerability of the U.S. infrastructure. Many power companies are still reacting to this development.
- The IEC is updating IEC 61000-2-9 (HEMP radiated environment): the first draft document has been produced, and the IEC is evaluating the update. Depending on the comments, it is possible this update could be published in 2025.
- Power companies are investigating ways to protect their electronics from HEMP (and IEMI). One company has selected their best substation building construction design after testing, and is planning to update the design to reduce the penetration of high-frequency fields. If successful, this new design will be their prototype for their future substation control house construction.

With regard to the IEMI aspects, Sven Fisahn compiled the report. The report covered the 2023 IEEE EMC Symposium tutorial in Grand Rapids, and a workshop held at EMC Europe in 2022 in Gothenburg. Frank Sabath presented the report at the meeting and provided additional information on the tutorial and workshop.

8) **Report from ESD Subcommittee – Shubhankar Marathe and Misha Khazhinsky**

Shubhankar Marathe presented the report from the ESD subcommittee, which was coauthored by Michael Khazhinsky. He discussed the paper exchange program between ESDA and the IEEE EMC Society. In particular the EOS/ESD Symposium scheduled for October 2023 in Riverside, California has 5 ESD papers, including 2 papers under the paper exchange agreement with the IEEE EMC Society. Also an update of ESD standards mainly from ANSI was provided.

Radasky commented that there were other ESD activities at the AP EMC and EMC Europe conferences that should be reported upon in the future. In addition, the important ESD standard, IEC 61000-4-2 is being updated, and it would be good to know what changes are being planned, as they will affect ESD testing worldwide. The purpose of the subcommittees in TC 5 are to update its members on worldwide activities in each field.

Further details can be found on this agenda item in the Attachment.

9) **Coordination with SC-1, Smart Grid – Mike McInerney**

McInerney introduced the activities of Special Committee 1 (Smart Grid), which is a coordinating committee, and he indicated that the SC 1 meeting had been held on Monday, with good attendance. It is noted that Mike McInerney is the Chairman of SC 1 and Bill Radasky continues in his role as Vice Chair while Prof. Thomas was not able to continue as Secretary. Leonardo Sandrolini was elected as Secretary. McInerney commented that TC 5 is keeping track of any issues involving Smart Grid and HPEM, and both the Chair and the Vice Chair of TC 5 have been attending the SC 1 meetings for many years.

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

McInerney is continuing in his role as webmaster for TC 5. He is usually able to quickly update the website, although this year there is a new system and software for updating the web page, and unfortunately the TCs were not notified of this in advance. The TAC promises to try to warn the TCs in the future of changes. The webpage for TC 5 can be found at: <https://www.emcs.org/committees/technical-committees/tc-5-high-power-electromagnetics/>

11) **Review of HPEM activities since last TC 5 meeting in Spokane – All**

Due to a lack of time, there was no detailed discussion concerning new developments in HPEM. McInerney asked that any new documents of a public nature be sent to him to post on our website.

12) **TC 5 Tutorials/Special Sessions planned at the EMC 2024 in Phoenix**

Based on the presentations provided at this meeting from the subcommittees, it appears that several tutorials and a special session will be proposed. Three proposals were discussed: one tutorial on HEMP/IEMI IEC Standards (Radasky); one special session on IEMI Risk Management (Sabath); and one tutorial on EM Information Leakage (Hayashi).

It is expected that in the December time frame, new proposals will be due, and the Chairman, Bill Radasky, will remind the subcommittee chairs to prepare their proposals for the 2024 conference. It is important that all proposals be coordinated with the management of TC 5 in order to ensure the proper endorsements are made.

13) **Discussion of Standardization Activities**

After many years of discussion concerning the need for a new IEEE standard dealing with the effects on electronics when an aircraft is struck by lightning, a new PAR 2838 has been approved. It is titled, "Aircraft Component Lightning Strike Direct Effects Qualification." Fred Heather mentioned that he is still looking for more experts to join the WG, and he has organized a meeting for the next day, Thursday. TC 5 members were encouraged to attend.

14) **Election Status of TC 5 Officers**

The current officers of TC 5 are serving 3-year terms that ends on 31 December 2025.

15) **Any other business - All**

No other business was raised.

16) **Adjournment**

The meeting was adjourned at 1:30 PM.

Attachments (labeled with agenda item)

- 1-Meeting Agenda
- 2-Confirmed Spokane Minutes
- 3-TC 5 Membership Update (including 2023 meeting attendees)
- 4-Report on Paper Review Process
- 5-Lightning Subcommittee Report
- 6-EM Information Leakage Subcommittee Report
- 7-HEMP/IEMI Subcommittee Report
- 8-ESD Subcommittee Report
- 12-Tutorial Proposal for 2024: IEC Standards for HEMP/IEMI