

EXECUTIVE SUMMARY

Session 2 – Power Quality and Electromagnetic Compatibility

SUMMARY

Session 2 deals with Power Quality EMC and Earthing issues in power distribution grids, collecting views and sharing experience of grid operators and users, equipment manufacturers, consulting engineers, the academic community and the energy regulators.

A total number of 137 papers have been accepted. 24 papers have been presented in the main session, 6 papers have been presented in the RIF. As observed in previous years, the majority of papers originates from universities and research institutions.

MAIN SESSION 2 - BLOCK 1

Electric and magnetic fields, transients and earthing systems

A major topic in block 1 was the earthing of substations. Different approaches to ensure earthing safety by design and simulation have been presented. In discussion it was emphasized that real measurements are essential.

The importance of electric and magnetic field issues seems to be slightly declining.

Block statistics: 6 papers presented, 24 papers accepted, ~150 attendees.

MAIN SESSION 2 - BLOCK 2

Harmonics and interharmonics

The question of emissions in the frequency range 2-150 kHz (supraharmonics) is still open and has to be studied in depth in the future; this includes the phenomenon itself, the measurement and the impact on these emissions on the grid and on neighbouring installations. The problem of “secondary emission” in different electric environment was addressed.

Block statistics: 6 papers presented, 37 papers accepted, ~120 attendees.

MAIN SESSION 2 - BLOCK 3

Voltage variations and dips

Voltage unbalance through decentralized production and single phase loads and possible ways for balancing (voltage regulated transformer or 3-phase LV load balancer) are under investigation.

With the out phasing of incandescent lamps and integration of inverter-based generators and loads, flicker has to be re-studied; this includes measurement protocols as well as the sensitivity of LED lamps. The phenomena flicker caused by interharmonics has to be re-investigated for the case of new lighting equipment.

Block statistics: 6 papers presented, 41 papers accepted, ~200 attendees.

MAIN SESSION 2 - BLOCK 4

Power quality monitoring and supply reliability

Power Quality monitoring is still an important topic. Requirements for measurement techniques in the future distribution grid and efficient PQ analysis of big data have been discussed. Use of monitoring data for the analysis of the propagation of PQ phenomena has been investigated.

A comparison of benchmarking methods of supply reliability in North America and Europe was presented.

Block statistics: 6 papers presented, 35 papers accepted, ~130 attendees.

ROUND TABLE 13***Power Quality and EMC in the Future Grid***

In round table 13 the intermediate results of the joint CIGRE/CIRED working group C4.24 were presented and discussed. New devices, new grid structures and characteristics, distributed generation possibly leading to weaker transmission systems and stronger distribution systems will change the PQ environment. There will be an impact on PQ assessment methods as well as emission and compatibility standards. The inclusion of supraharmonics in standardisation was emphasized again.

RT statistics: 5 speakers, ~50 attendees.

ROUND TABLE 15***Reliability Benchmarking - why we should do it? What should be done in future?***

In round table 15 motivation and methods for reliability benchmarking were presented. It turned out that there is a need of harmonisation of standards (including individual company standards) and their application to provide comparable results. Another important topic is the definition of exceptional events and whether they should be regarded in the reliability statistics. Reliability raw data are partly assessed automatically, data quality is rather good. Reliability benchmarking itself was not questioned during the discussion.

RT statistics: 5 speakers, ~50 attendees.

RESEARCH & INNOVATION FORUM SESSION 2

The following topics were presented and intensely discussed during the RIF:

- unconventional optimization methods (e.g. particle swarm),
- harmonic state estimation
- definition of a unified PQ index,
- segmentation of event measurement data
- provision of differentiated, tailored PQ to customers,
- big data compression

RIF statistics: 6 papers presented, ~25 attendees

POSTER TOURS

8 guided tours (always 2 in parallel) were organised with support of SAG members. The poster tours were characterised by good discussion and good interaction

CONCLUSIONS

Session 2 was generally characterized by good presentations and vivid discussions. Supra harmonics, coming along with new devices connected to the grid, are an upcoming topic.

Further important topics that were addressed are

- influence of EV charging on power quality (harmonics, unbalance),
- influence of PV installations on power quality (flicker, harmonics, unbalance),
- assessment of hosting capacity for PV and EV charging stations in distribution systems,
- power quality monitoring and related big data handling
- mismatch between regulations (immunity standards and emission levels)