

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING
Academic Year 2023-24 (Odd Semester)

Internal IEEE Faculty Seminar Report

Title of the seminar : Hybrid Common-mode EMI Filter Design for Electric Vehicle Traction Inverters
Date : 29.09.2023
Resource Person : Dr.P. Narasimman, Assistant Professor/EEE, KCE
Beneficiaries : EEE Faculty Members- 8
Venue : EEE – Smart Classroom

On behalf of the Department of EEE and IEEE Branch organized an Internal Seminar on “Hybrid Common-mode EMI Filter Design for Electric Vehicle Traction Inverters” for the faculty members of EEE Department on 29.09.2023. The main objective of the internal seminar is to provide an exposure to our faculty members on EMI filter design for electric vehicle traction.

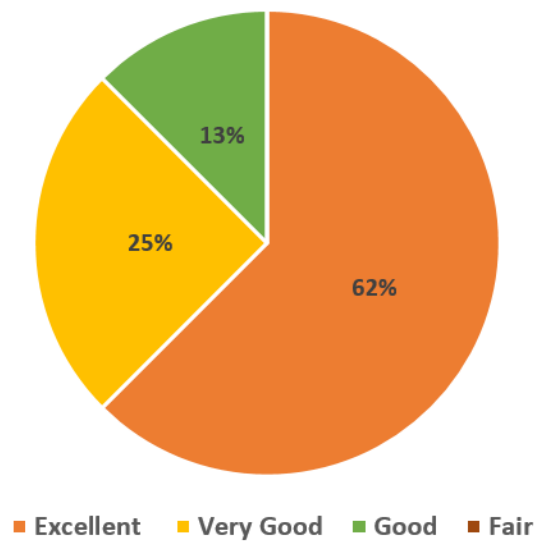
The following points were discussed during the session:

- The switching actions of power semiconductor devices, such as IGBTs or MOSFETs, generate differential mode (DM) and common mode (CM) electromagnetic interference (EMI) voltages or currents flowing through the power source.
- EMI noise spreads widely in the frequency range of 150 kHz to 108 MHz, as specified in the CISPR 25:2016 standard.
- The equivalent CM circuit with the current-sensing current-compensating (CSCC) AEF, with which the CM current is sensed, amplified, and then injected into the main circuit so that the CM noise flowing through the LISN is ideally cancelled.
- The sensed signal from the CT is then fed to the amplifier stage, which is implemented as a current-controlled current source that mainly comprises an operational amplifier (op-amp) circuit and a class AB amplifier formed by the NPN and PNP transistors.
- The active filter stage is only appropriate for compensating for the low- and medium-frequency CM noise owing to the limited bandwidth of the actual op-amp and class AB amplifier.

Photos:



Feedback Analysis:



References:

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4. B Narayanasamy, F Luo. A survey of active EMI filters for conducted EMI noise reduction in power electronic converters. IEEE Transactions on Electromagnetic Compatibility, 2019, 61(6): 2040-2049.
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6. International Electrotechnical Committee. Vehicles, boats and internal combustion engines- Radio disturbance characteristics-Limits and methods of measurement for the protection of onboard receivers. CISPR 25, 2016.
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8. A Vedde, M Neuburger, C Cheshire, et al. Optimization of a passive common mode EMI filter by adding an active feedback loop. 2021 IEEE Southern Power Electronics Conference (SPEC), December 6-9, 2021, Kigali, Rwanda. IEEE, 2021: 1-6.
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Staff Incharge


HoD/EEE 5/10/23


Principal 07/10/2023