RESEARCH CONCERNING CHARACTERIZATION AND IMPROVEMENT OF THE ELECTROMAGNETIC ENVIRONMENT IN MODERN CARS

Goal of the project

- Assessment of the electromagnetic environment in modern vehicles: technical and legal aspects;
- Assessment and analysis of measuring and testing methods and of equipment involved in Automotive EMC;
- Implementation of novel test and measurement methods in Automotive EMC and improvement of the testing repeatability
- Applications of metamaterials to Automotive EMC.

Short description of the project

This project is component of the complex project *Hybrid Platform for Communication in Visible Light and Augmented Reality for the Development of Intelligent Systems for Assistance and Active Security of Vehicles*, 21PCCDI / 2018.

Project implemented by

Politehnica University Timişoara,
Faculty of Electronics, Communications and Information Technology,
Department of Measurements and Optical Electronics

Implementation period

18.05.2018 - 16.11.2020

Main activities

1. Characterization of the electromagnetic environment in vehicles:
   - Near field and far field measurement;
   - Spectral occupancy measurement.
2. Improvement of repeatability of Automotive MC tests
   - Assessment of devices and equipment involved;
   - Interlaboratory testing and comparisons
   - Far-field prediction from near-field measurements data;
   - Prediction of far-field radiation from current measurement.
3. Methods of reduction of conducted and radiated emissions;
   - Resonance analysis of systems that fail EMC tests;
   - Applications of metamaterials: filtering, suppressing of cavity oscillations, screening with frequency selective surfaces.

Results

2018-2019

- Documentations and reports concerning assessment of electromagnetic field in modern cars;
- Documentations and reports concerning EMC Automotivex inter-laboratory comparisons, chamber validation and equipment assessment;
- Documentation adn reports concerning applications of periodic structures in the Automotive EMC field;

21 published papers on:

- Application of Frequency Selective Surfaces (Fig. 1);
- Interlaboratory comparison of radiated emissions;
- ALSE chamber validation (Fig. 2);
- Stripline measurements in Automotive EMC;
- Near field measurements and applications to emission reduction (Fig. 3);
- Frequency selective surfaces;
- Spectrum occupancy measurement in the HF domain;
- Application of Rasberry Pi.

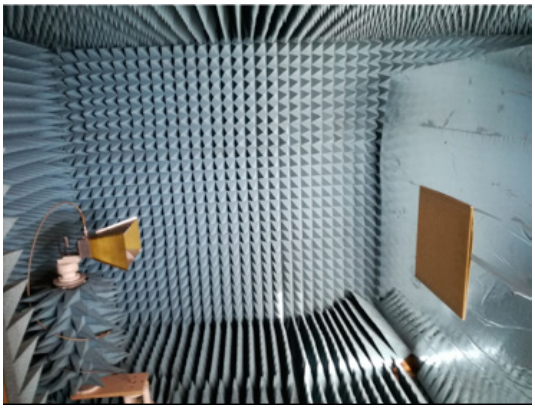

Fig. 1. Spatial filter based on a frequency selective surface tested in anechoic room

Fig. 2. Testing setup for chamber validation with biconic antenna in semi-anechoic room

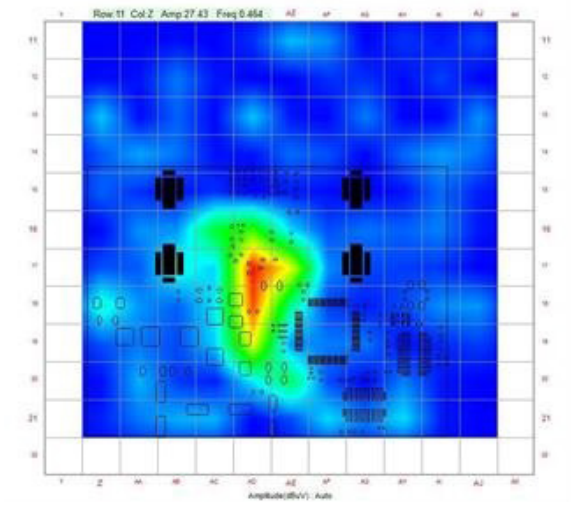

Fig. 3. Near-field scanning result

Applicability and transferability of the results

Results obtained in this research might be useful to:

- EMC laboratories, mainly related to Automotive industry;
- EMC professionals;
- EMC research community;
- EMC standards elaboration;
- Legal authorities that regulate spectrum occupancy;
- Professionals working in Automotive design.

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