

Interaction of Complicated Harness with Antenna

The EMC problems, which acquire in automobile EMC, can be investigated using component-testing technique.

The complex automotive cable harness can be considered above finite metallic plate for component test. The noise produced by harness without influence of car model can be estimated using Hybrid Analysis Type.

Problem Definition

The aim of the technical note is shown possibilities of Hybrid Analysis Type in EMC problems related to automotive cable harness.

Coupling of automotive cable harness to planar glass antenna is investigated. The transmission coefficient between cable harness and antenna is estimated using EMC Studio Hybrid calculation and measurements.

Actual view of measurement setup of single wire and cables harness above ground with additional closer view of terminations configuration is shown in the figure below.

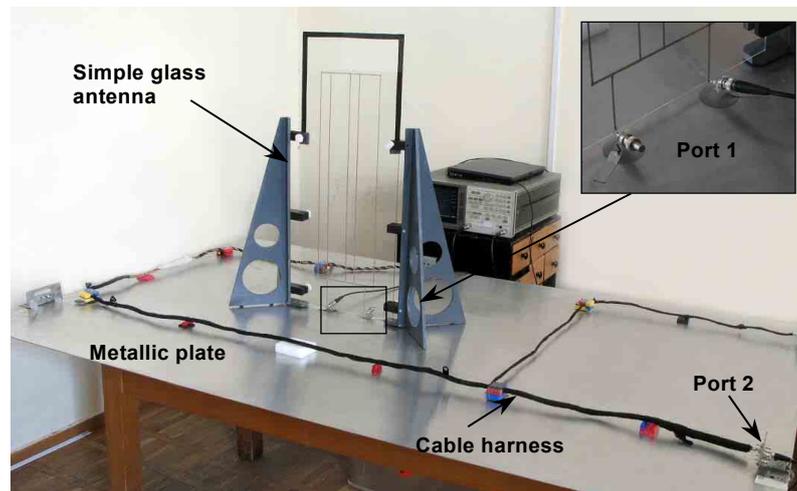


Fig. 1. Measurement setup (general view)



Fig. 2. Termination 1

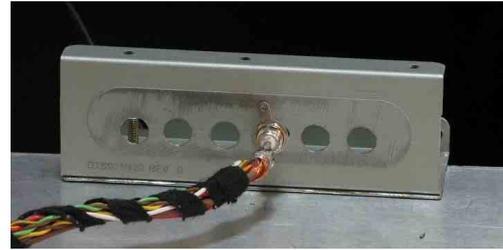


Fig. 3. Termination 2



Fig. 4. Termination 3

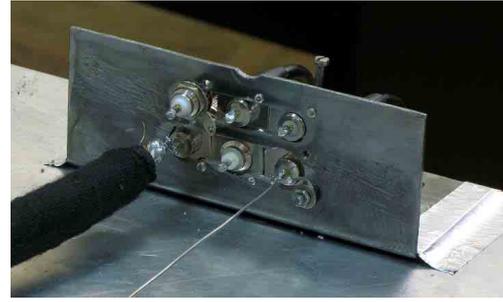


Fig. 5. Active termination

Electromagnetic interference between cable harness and antenna is measured in EMCoS measurement laboratory.

The corresponding simulation model is shown in the following figure.

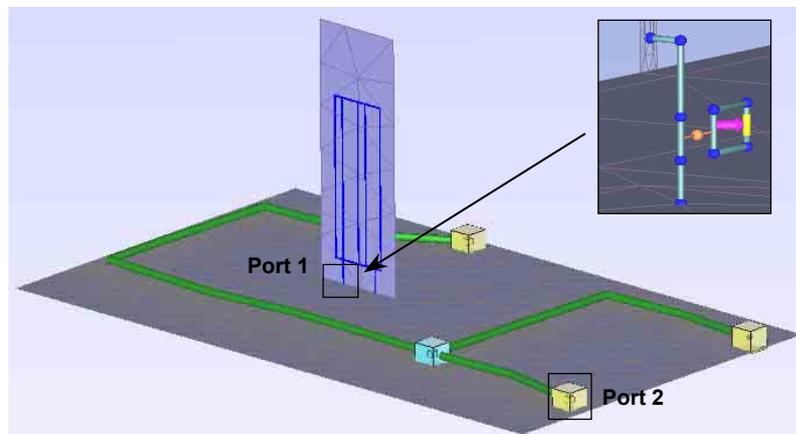


Fig. 6. Single wire and car harness

Devices at active (connected to network analyzer) and passive terminations of cable system are schematically shown in the figure below.

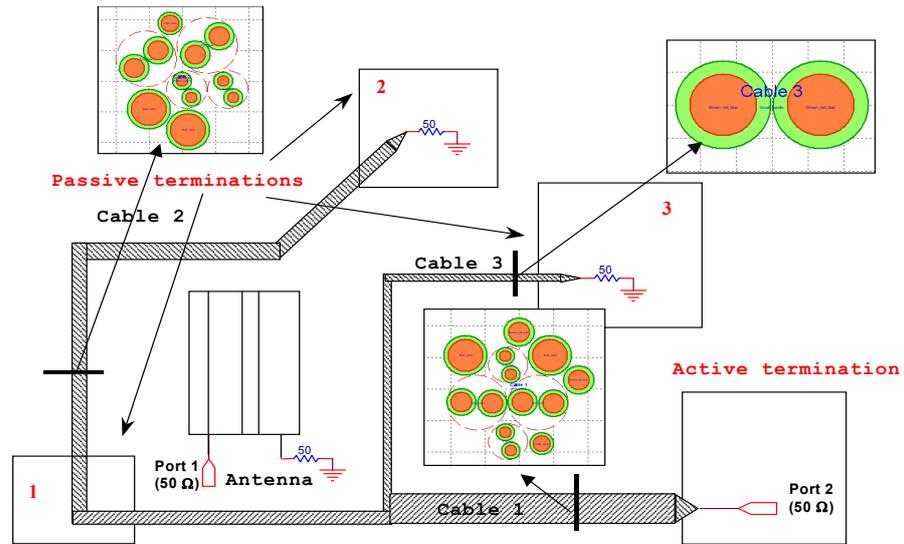


Fig. 7. Schematic representation of terminations

Numerical Results

Comparisons of simulation results and measurement data for transmission coefficient are shown below.

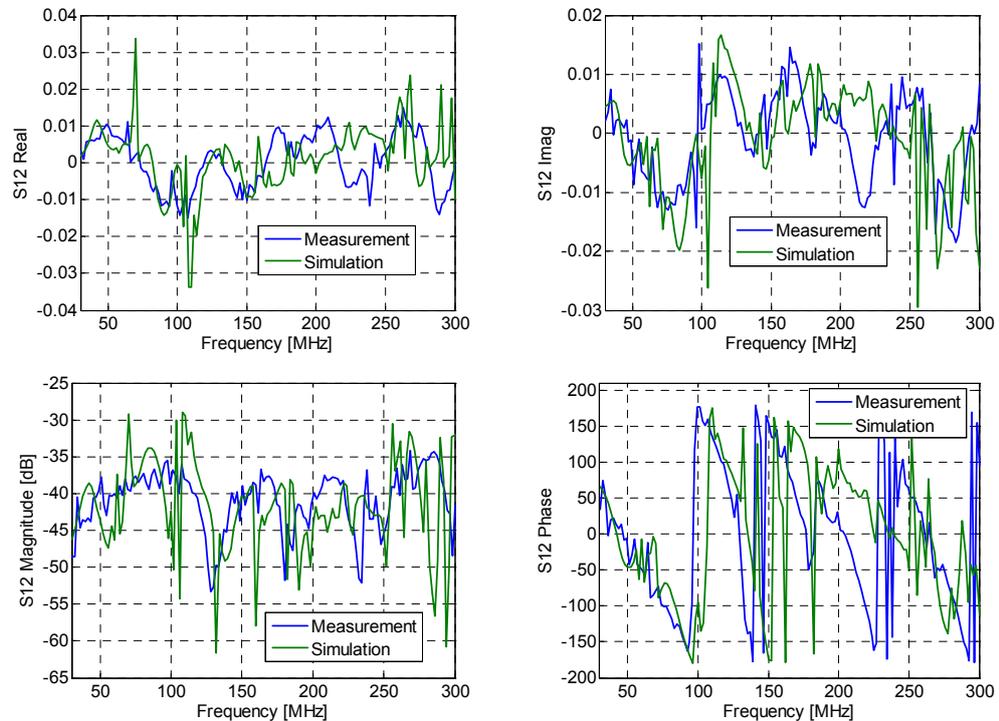


Fig. 8. S12 parameter vs. frequency

Conclusions

- Hybrid Analyses Type gives possibility for simulation of complex automotive harness systems electromagnetic interaction with external equipment
- The simulation results shown correct level and frequency behavior of transmission coefficient
- The slight disagreement between simulation and measurement results can be related to measurement uncertainties