

An Interaction Between Electromagnetic Field And Materials: Characterization Of Shields For Automotive Electromagnetic Compatibility Applications

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Abstract

For more than thirty years the GeePs Laboratory has been working on the numerical simulation of electromagnetic systems through numerous research topics. During this conference, we propose to present a recent problem that has been addressed by the laboratory. It is connected to ElectroMagnetic Compatibility (EMC) problems and deals with the efficiency of electromagnetic shielding for automotive applications, a very hot challenge due to the intensive use of electronics on board and contactless charging for electric vehicles. A 2D and 3D finite element modeling with COMSOL Multiphysics® in low frequency was used to evaluate the shielding effectiveness. A particular attention has been paid to the mesh: A solution mixing different kinds of geometrical elements was used in the mesh generation to obtain an accurate solution in thin regions. Parameter sweeps were used to characterize and to optimize the shielding properties. In this context, 2D and 3D demonstrators using 'Comsol Application' have been developed with a parameter sweep possibility. [Al Achkar et al. 2020], [Pei 2020]

Reference

[Al Achkar et al. 2020] G. Al Achkar, L. Pichon, L. Daniel, N. Benjelloun: Effective electromagnetic properties of woven fiber composites for shielding applications, IEEE Transactions on Electromagnetic Compatibility, 62(4) : 1082-1089, 2020.

[Pei 2020] Y. Pei, L. Pichon, M. Bensetti, Y. Le Bihan, Sensitivity analysis of an inductive power transfer system using polynomial chaos expansions, 5th Workshop on Uncertainty Modelling for ElectroMagnetic Applications, 2020.

Figures used in the abstract

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Figure 1 : Electromagnetic shielding Effectiveness in automotive context