(3-EN) Finite element simulation and modelling of wireless channels inside traction batteries by means of CST Microwave Studio

Project and Motivation
IntLiLon is a research and industrial cooperation with the companies Bosch and ProDesign, as well as the Hannover University of Applied Sciences. Under this project, we investigate a radio-based (wireless) data transmission inside the lithium-ion batteries of electric and hybrid vehicles as an alternative to reduce the amount of wiring inside the battery. A deep understanding of the wireless channel inside the battery is mandatory for this application. Some models of complex antennas for finite element simulations in CST Microwave Studio have been already created. These antennas have been also measured in a channel emulator, and the comparison between both results has been considerably accurate. Therefore, we expect to do further research in the analysis of the wireless channel inside the battery by means of simulations, in situations that cannot be easily (or cheaply) measured in the emulator.

Task
Under this work, easy models of basic antennas must be developed, which could be used as probes for the electric and the magnetic fields, i.e. monopole antennas for the E-Field and loop antennas for the H-Field. Some topics that must be studied among others are: the transfer function between antennas under different scenarios, the field distribution, the presence of obstacles and the employment of small electrical antennas.

Pre-knowledge
- Solid knowledge of Electromagnetism
- Antennas and propagation basics
- Basics of CST Microwave Studio is a big advantage but not mandatory