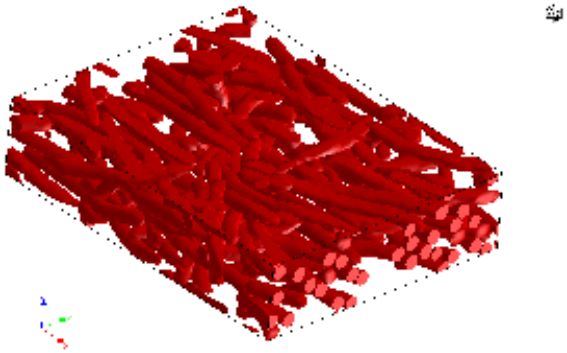
EMI (VE)

As a reminder, the electromagnetic (EM) shielding of a material has the objective of cutting off the EM waves on a range of frequencies so that it will not create any interference and will not damage the functionality and integrity of electronic systems (besides protecting passengers). One solution among many others (compounding, coating, overmolded or impregnated conductive fabrics, conductive polymers…) consists in compounding a polymer with conductive fillers.

In order to optimize such a formulation and to quantify the influence of the microstructure (filler dimensions, orientation, …) on the shielding efficiency, we can run simulations on Representative Volume elements (RVE). An advantage of the approach is to be able to predict the electrical percolation threshold (which cannot be captured by homogenized theories) but the main limitation is the need to get access to the microstructure. This is illustrated in the following document.



Besides the predictions at the microlevel, the interaction between a real 3D part and the electromagnetic field can be calculated using the Comsol tool from which the shielding might be derived. Since it is a new domain (for us), we used a simple model, i.e. an antenna as the source of the EM field and a rectangular box made of a “semi-conductive” material. The approach was then tested on a real (but simplified though) inverter. The main outcome of these simulations are given in this document.