OTTO VON GUERICKE UNIVERSITÄT MAGDEBURG

CHAIR OF ELECTROMAGNETIC COMPATIBILITY

MA Simulation of the Plane Wave Coupling to Non-Linearly Loaded Transmission Networks #MS #MS

Background and problem: Cables are important coupling paths of external electromagnetic fields into connected devices and systems. In practice, not only single cables but cables harnesses occur that can be regarded as transmission line networks. External fields can often be approximated as plane waves, at least in the far field region.

The simulation of the plane wave coupling to transmission line networks is quite well understood in the frequency domain. Nevertheless, when the loads at the terminals of the network feature a non-linear behavior, e.g. as for a diode, the calculation ha to be done in time domain. Such calculation has already been done for a single cable, where the exciting field was incorporated several distributed sources along the line.

Task: The task of this project is do adopt this approach for a transmission line network by taking into account the interaction between the individual lines. For simplicity, the lines can be assumed to be straight, uniform and of low loss. For linear loads anc certain pulsed excitation, the time response of the coupled voltage or current should be validated against a frequency-domain solution with a following inverse Fourier transform. Then also the time response of the coupled voltage or current for a non-linea load shall be calculated.

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