

Asymptotic analysis of electromagnetic waves propagation in coaxial cables

Sébastien Imperiale, Inria

We focus on the time-domain simulation of the propagation of electromagnetic waves in non-homogeneous lossy coaxial cables. The full 3D Maxwell equations, that described the propagation of current and electric potential, are classically not tackled directly, but instead a 1D scalar model known as the telegraphist's model is used. Such an issue has already been dealt with in the engineering literature or in the applied mathematics literature using systematically a modal approach in the Fourier domain. In this talk, we aim at justifying a time-domain "homogenized" telegraphist's model obtained via asymptotic analysis, for coaxial cable whose cross-section is not homogeneous. Our model also includes a non-local in time operator that account for losses due to the so-called skin-effect.