

SOURCE: Electrical Engineering Department, Université Catholique de Louvain, ICTEAM, Louvain-La-Neuve, Belgium

NFFT-based inhomogeneous plane-wave physical optics dedicated to radio-channel estimation in urban environment

Quentin Gueuning, Christophe Craeye, and Claude Oestges

In this paper, we present a fast method for the evaluation of the near-field physical optics (PO) radiation integral on arbitrarily-oriented planar domains. It combines a spectral-domain contour deformation technique, used to accelerate the convergence of the numerical quadrature and to circumvent the real-axis free-space singularity of the integrand, and a recently-published extension of the nonequispaced Fast Fourier Transform (NFFT) to Laplace transforms, used to rapidly perform direct and inverse transformations from spatial domain to complex spectral domain. The method is illustrated through an example where we computed, inside a planar observation domain, the backscattered magnetic field from a plate positioned in front of an elementary electrical dipole. Given a prescribed relative error of 3 digits, the computation time is currently in a matter of few seconds.

Quentin Gueuning
ICTEAM
Electrical Engineering Department
Place du Levant, 3
1348 Louvain-La-Neuve
BELGIUM
Phone: + 32-010 47 80 94
Email: quentin.gueuning@uclouvain.be