LightTrans’ Talk at EOS Topical Meeting on Diffractive Optics 2019

A K-Domain Method for Fast Propagation of Electromagnetic Fields Through Graded-Index Media

Session time: 16 September 2019 | 10:20 – 10:40

Paper authors: H. Zhong\textsuperscript{1,2}, S. Zhang\textsuperscript{2}, R. Shi\textsuperscript{1,2}, C. Hellmann\textsuperscript{3}, and F. Wyrowski\textsuperscript{1}

\textsuperscript{1} Friedrich Schiller University Jena | Germany
\textsuperscript{2} LightTrans International UG | Jena, Germany
\textsuperscript{3} Wyrowski Photonics GmbH | Jena, Germany

Presenting Author: Huiying Zhong

Abstract

In this work we offer a \textit{k}-domain-based method for the fast calculation of fields propagating through graded-index (GRIN) media. It is potentially fast because of two reasons: (1) in the \textit{k}-domain, Maxwells equations for GRIN media become ordinary differential equations, so that we can take advantage of Runge-Kutta-type mathematical approaches to reduce the numerical effort; (2) taking advantage of fast Fourier transform algorithms to convert the convolution-type calculation (O(N^2)) into a multiplication (O(N)). Several advantages arise when comparing this work with the famous split-step method: there is no paraxial approximation and the GRIN dependence along the main propagating direction can be accurately modeled.