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FAST PHYSICAL OPTICS SOFTWARE

LightTrans' talks at SPIE Optical Systems Design 2018

Semi-analytical Fourier transform and its application to physical-optics modelling

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The Fast Fourier transform (FFT) algorithm constitutes the backbone for fast physical optics modelling. The numerical effort of the FFT technique is approximately linear with the required number of sampling points of the complex amplitude of a field component. However, in optics we often deal with field components which possess a strong wavefront phase, whose complex sampling leads to a huge numerical effort even in the case of the FFT. We propose a way to handle the Fourier transform which does not require the sampling of second-order polynomial phase terms, but rather treats them analytically. We present the theory of the semi-analytical FFT alongside several examples to demonstrate the great potential of this approach.

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