Discrete fractional Fourier transform as a fast algorithm for evaluating the diffraction pattern of pulsed radiation

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Abstract

A technique is proposed for computing the field radiated from a rectangular aperture. This technique, based on the discrete fractional Fourier transform, avoids the complexities of computing the diffraction pattern by the direct evaluation of the Fresnel integral. The advocated approach provides a fast and accurate computational tool, especially in the case of evaluating pulsed fields radiated through two-dimensional screens of complex amplitude. A detailed numerical study that demonstrates the efficacy of this approach is carried out.

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