Generation of Nonevanescent Diffraction-less 2D Beams with Subwavelength Widths in High-refraction-index Media

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**Abstract.** Non-diffracting light beams with subwavelength transverse dimensions are evanescent when propagating in free space. There are well-known linear solutions to the wave equations that predict the diffraction-less propagation of nonevanescent subwavelength beams in unbounded homogeneous linear media with high refractive indices. The present study describes a method for creating such beams by connecting a Fresnel-type (Fresnel-waveguide) light source to the optical medium through which the beams are propagated. The parameters of the source and medium for producing two-dimensional (2D) beams with nanometre-scale widths are obtained through analytical and numerical analyses. The two models of the Fresnel-waveguide source have been investigated. The Fresnel waveguide in the first model is a linear array of beams formed by the periodic lateral translation and phase change of a light beam launched from a metal slit (2D-waveguide). In the second model, a phased array of metal 2D-waveguides in contact with the optical medium simulates the Fresnel-waveguide source.

**Keywords:** non-diffracting subwavelength nonevanescent 2D-nanobeams, 2D-nanostructures

 **Biography:** Prof. S. V. Kukhlevsky received a CSc in Physics from the Hungarian Academy of Sciences (HAS) and a Ph.D. degree in Physics from the University of Pecs (UP), Hungary, in 1995. From 1993 to 1996, he was an Assistant Professor with the Department of Physics at UP. From 1997 to 2009, he was an Associate Professor with the Department of Physics at UP. He received a DSc in 2008 from HAS. From 2009 until now, he has been a Professor with the Department of Physics, UP. His research interests include nanooptics, nanophotonics, diffraction-less beam optics, plasma-based x-ray lasers and x-ray optics.