

THREE DIMENSIONAL MODEL FOR PROPAGATION IN THE TROPOSPHERE AND INVERSE DIFFRACTION

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ABSTRACT

The parabolic wave equation model (PEM) can be applied to model the propagation of electromagnetic signals in the troposphere and electromagnetic scattering. In this paper the concept of inverse diffraction is investigated for the case of the three dimensional (3D) PEM. Inverse diffraction is an algorithm that produces field convergence by inverting the PEM diffraction term and can be applied to find the transmitter location. The inverse diffraction radiolocation algorithm can be related to existing, standard radiolocation methods and is an efficient method for locating a transmitter using intercepted emissions. The 3D PEM presented in this paper gives correct spatial phase. Correct spatial phase for the PEM is essential for the inverse diffraction algorithm to process observed data correctly. Examples are discussed for propagation with atmospheric refraction and over irregular terrain.