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13 ABSTRACT (Maximum 200 words)

Several parabolic equation models currently exist that model radiowave propagation over the ocean. Few of these models can accurately account for rough surface effects over an ocean environment. Several techniques to account for these effects, implemented within the split-step parabolic equation (PE) algorithm, are investigated.

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A COMPARISON OF ROUGH SURFACE PARABOLIC EQUATION MODELS

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Several parabolic equation models currently exist that model radiowave propagation over the ocean. Few of these models can accurately account for rough surface effects over an ocean environment. Several techniques to account for these effects, implemented within the split-step parabolic equation (PE) algorithm, are investigated.

Two of the rough surface algorithms to be discussed were originally developed to model acoustic wave fields incident on a rough boundary. The first model (M.E. Moore-Head, E.S. Holmes, JASA, 86(1), 247-251, 1989) is based on an angle-dependent surface loss function that is applied to the field in a layer near the surface. The second model (Tappert, private communication) does not depend on incident angle, but instead modifies the PE by including the impedance boundary condition as a singular index of refraction. The third method uses the mixed transform algorithm (J.R Kuttler, G.D. Dockery, Radio Sci., Mar.-Apr., 381-393, 1991), in which the impedance boundary condition is directly applied to the field at each range step. This method relies on an equivalent rough surface reflection coefficient, which is angle-dependent. The final method simply modifies the starter field by multiplying the rough surface reflection coefficient and the reflected field.

All of the above models will be compared with a reference waveguide model that is shown to agree well with signals measured in the presence of slight to moderate sea states.

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