

**PREDICTION OF RADAR COVERAGE UNDER  
ANOMALOUS PROPAGATION CONDITION FOR  
A TYPICAL COASTAL SITE - A CASE-STUDY**

**ABDULJAUWAD, SH; KHAN, PZ; HALAWANI, TO**

**AMER GEOPHYSICAL UNION, RADIO SCIENCE; pp: 909-919; Vol: 26**

King Fahd University of Petroleum & Minerals

**<http://www.kfupm.edu.sa>**

**Summary**

In this study a model predicting the electromagnetic wave propagation has been developed. The model is initialized with a known refractivity profile and an initial transmitted field. The troposphere is assumed to be inhomogeneous in height and range. The vertical refractivity profile is computed from the meteorological upper air data. Arbitrary as well as experimentally observed profiles could be used as inputs to the model. Inhomogeneity in range is invoked by injecting refractivity profiles at known locations. A transmitter with a Gaussian beam is assumed to generate the initial field based on the transmitter parameters such as vertical beam width, vertical beam elevation, transmitter frequency, antenna height, and type of polarization. A simulation for the typical site on the coast of Arabian Gulf has been chosen for the study. The field strength and radar coverage for different conditions of the typical coastal site prevailing a standard and inhomogeneous surface duct demonstrates the sensitivity of the model with the inhomogeneous and homogeneous atmosphere. Radiated fields are predicted on the basis of the initial field, boundary conditions, and atmospheric conditions considering the effect of refractivity in the case of inhomogeneous surface duct and elevated duct. Results reported in this study demonstrate the trapping of the energy in ducting atmosphere above the minimum trapping frequency with the predicted field by this model.

**References:**

1. CRAIG KH, 1988, ELECTRON LETT, V24, P1136
2. DOCKERY GD, 1988, IEEE T ANTENN PROPAG, V36, P1464

© Copyright: King Fahd University of Petroleum & Minerals;  
<http://www.kfupm.edu.sa>

3. HARDIN RH, 1973, SIAM REV, V15, P423
4. JENSEN F, 1975, SM72 SACL SPEZ MEM
5. KERR DE, 1951, PROPAGATION SHORT RA
6. KO HW, 1983, J HOPKINS APL TECH D, V4, P12
7. KO HW, 1986, MAY EL SHOW CONN I E
8. LEONTOVICH M, 1946, J PHYSICS, V10, P13
9. SENIOR TBA, 1960, APPL SCI RES B, V8, P418
10. SKURA JP, 1987, J HOPKINS APL TECHN, V8, P418

For pre-prints please write to: [abstracts@kfupm.edu.sa](mailto:abstracts@kfupm.edu.sa)