PROPAGATION MODELLING ON AN EXPERIMENTAL MICROWAVE LINK

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Experimental measurements were made for a number of years on a 51 km tropospheric microwave link. The system used consisted of a 16-element vertical receiving array designed to determine the amplitude and angle-of-arrival of individual components in a multipath situation. The system operated at a frequency of 16.65GHz and accumulated such data at 1 second interval on a continuous basis over the summer fading season. Results indicated that signal fading often could be ascribed to the presence of either ground-based or elevated layers with distinctive characteristics.

Tropospheric refractivity profiles in the study of line-of-sight microwave links are often modeled as a piece-wise linear or a smooth function with no variation along the entire microwave link path. Observations using acoustic sounders at each end of the above microwave link suggest that in reality the tropospheric layers along the link are characterized by fluctuations in height of up to several tens of meters.

An attempt is made here to model statistically the behaviour of such rough layers and the effects on the propagation from transmitter to receiver. In this, use is made of a parabolic equation description of microwave propagation to calculate received signal amplitude and AOA. A split-step Fourier method has been selected to numerically implement the PE method. This approach is capable of accurate results and is implementable on a high-end personal computer in a reasonable time-frame. Interaction with the ground is well accommodated and an available detailed digital ground profile has been used in allowing for the effects of ground reflections. The results of this exercise are compared to the experimentally observed effects.

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2. F - Wave Propagation and Remote Sensing

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