Analysis of Multi-path Effect on the Wavefront

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ABSTRACT

When the metal target is illuminated by an incident wave, the surface of the metal target will induce surface current density, which, in turn will re-radiate. In high-frequency approximation, the radiated field can be solved using the theory of reflection and diffraction. During the wave propagation, the ripple, which include phase and amplitude , of wavefront will be changed due to the phase difference of different path length. This is the effects of multi-path. These effects depend on frequency, polarization, target position, and target shape, etc. These effects can be solved by numerical methods. A real example of the outdoor far field at Lung-Yuan Science Park will be illustrated in the thesis. The outdoor far field is used for the measurements of antenna patterns and radar cross sections. Recently, an electrical high-power tower was installed near the outside-range far field. The outside-range far field will be degraded due to the high power tower. In this thesis, the GO (Geometrical Optics) and GTD (Geometrical Theory of Diffraction) will be employed to analyze the effects of high power tower. The high power tower will be simulated and verified in the microwave anechoic chamber which is built at Da-Yeh University recently. During the analyses, we developed a special technique, cosine weighting function on the antenna quiet zone, to locate the direction of wave source in a multi-path enviroment.

Keywords : Geometrical Optics ; Geometrical theory of Diffraction ; Physical Optics ; Multi-path ; Quiet-zone ; Weighting

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