

A New Approach on the Scattering of Electromagnetic Radiation for Spherical Raindrop by the Invariant Imbedding Method

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In satellite communication, attenuation, scattering, and depolarization of relatively high frequency waves such as millimeter waves are strongly influenced by rain. In order to study the rain attenuation, we introduce a new theoretical method, which enables us to obtain the reflection and transmission coefficients in arbitrary medium. We adopt this method to examine how the electromagnetic radiation is affected by homogeneous spherical raindrops. It is assumed that the raindrop shape is spherical and linearly locate in one direction. For the radiation of wave in raindrops, we consider the effective permittivity, in which the raindrop is assumed to be spherical. By adopting the invariant imbedding approach, the 1st order differential equations are derived for the reflection and transmission coefficients. We investigate the transmission and reflection of waves for various incident angles when the spherical raindrops are assumed to have random sizes.