Modeling Microwave Scattering Behavior on the Ground Conducting Object

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Abstract

Physical scattering models have been developed to interpret the information contained in Synthetic Aperture Radar (SAR) images over the last few decades. Although most of studies were focused on modeling microwave signal from the natural dielectric scatterers, artificial conducting scatterers such as ship, power line, and building are also important features on the earth surface. One of the most prominent artificial conducting features on the earth surface is power transmission tower. This large conducting object can lead a misunderstanding in classification of SAR image, and cause an unexpected additional phase in radar interferometry. In this study, a forward modeling method was used to examine the scattering signal from the power transmission tower for selected incidence angles and wave lengths. The backscattered microwave signal was calculated from Maxwell's equation and its boundary condition for conducting boundary.

Detailed surveying of power transmission tower was carried out to set up scattering simulation. Body of tower is divided into proper number of fragments satisfying both reality in approximation and time effectiveness in calculation. The simulator will integrate electric fields generated by each fragment. Numerical simulation was conducted as a function of the incidence angle and the wave length. The simulated result was compared with the JPL TOPSAR data over a selected power transmission tower in Jeju island, Korea.