ON THE FULL-WAVE SOLUTION FOR ELECTROMAGNETIC SCATTERING FROM SNOWPACKS

1. Extended Abstract

The electromagnetic scattering from snowpacks is an important topic in remote sensing applications. In this work, we present a novel approach to solve this problem using the statistical splitting approach (SSWaP) method. The SSWaP method is an efficient full-wave electromagnetic solver for scattering from snowpacks, which is discussed in this paper.

The SSWaP method is based on the spectral domain method (DDA) and uses a two-step procedure to simulate the electromagnetic scattering from snowpacks. In the first step, the medium sample is generated using a statistical model. In the second step, the electromagnetic scattering response is characterized using the full-wave solver.

Both techniques show good agreement in the results of the coherent scattered power. After the medium sample is generated, the electromagnetic scattering response is characterized using the full-wave solver. The scattered power to the incident power for a specific direction and polarization is calculated. The total forward and backward scattered fields from a large domain of snowpack are simulated using the FEM (finite element method) and DDA method. These results are compared between both techniques, and a Casscading Algorithm that accounts for the multiple scattering interaction is used.

The FEM-based method is an integral matrix method that accounts for both coherent and incoherent interactions inside the medium. The DDA method is an integral pseudospectral solver which generates matrices that represent the electromagnetic interactions between the different slabs. The SSWaP method is an efficient full-wave method that calculates the scattered power to the incident power for a specific direction and polarization. After the medium sample is generated, the electromagnetic scattering response is characterized using the full-wave solver. The total forward and backward scattered fields from a large domain of snowpack are simulated using the DDA method. These results are compared between both techniques.

References


2. References
