

A COMPLETE THEORY OF HIGH-FREQUENCY EM WAVES - GPR APPLICATIONS

SILVA, JADIR DA CONCEIÇÃO DA

Over the last years Ground Penetrating Radar (GPR) has been used to investigate the near surface of the earth. Sometimes inaccurate results occur because some really important physical aspects are neglected. As example one can mention effects concerned with complex dielectric constant and conductivity. Such effects are given by the atomic polarization in phase with the EM field and also the rock conductivity and relaxation effects of the polar water molecule, the quadrature compound of the field. The aim of this study is to determine which effects are really important in the Maxwell equations taking into accounting the antenna frequency, soil conductivity and water content. An example of analytical solution of the E-uncoupled Maxwell equations are given and compared with the more applicables Cole-Cole-based models. Results of this study enable us to conclude that on the nowadays GPR frequency range all needs are ideally established for all kind of soil mapping.