

Universal Dielectric Response of Atmospheric Ice Using COMSOL Multiphysics®

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Abstract

A universal dielectric response (UDR) is frequency independent at low frequencies whereas it has a power law relationship at high frequencies. Heterogenous materials with different phases that are conductive and insulating (dielectric) are physically present in different naturally occurring materials particularly atmospheric ice. Jonscher's proposed 'universal dielectric response' [1] is not sufficient for such materials as it only reflect conductivity as a nonlinear function of frequency whereas at lower temperatures dipolar vibrations are very sensitive to temperature. A numerical study using COMSOL Multiphysics® for complex material as like atmospheric ice has been carried out in order to find a bounded empirical relation by including temperature as another variable in 'Universal Dielectric Response'.

Reference

1. Jonscher, A.K., The Universal Dielectric Response. 1990 Ceidp Whitehead Memorial Lecture, Royal Holloway College, University of London, Egham, Surrey, TW2W0, 0EX, 1990.

Figures used in the abstract

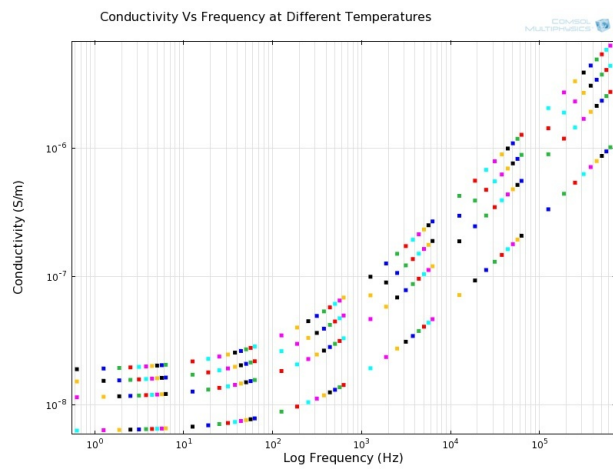


Figure 1: Conductivity Variation at Different Temperature For Atmospheric Ice