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ELECTROMAGNETIC CHARACTERIZATION OF ADVANCED NANOSTRUCTURED MATERIALS

Abstract

In this work the electromagnetic characterization of resin reinforced with carbon and metallic nanoparticles is presented. In particular, the electric permittivity and the magnetic permeability as a function of the frequency are used to study the electromagnetic absorption capability of the nanocomposite materials. The aim is their application in advanced coating able to reduce the electromagnetic reflectivity of satellite surfaces in specific frequency ranges, in a special way for those surfaces that for some reason could be exposed to the antenna radiation pattern. In fact, the interference caused by the spurious electromagnetic multipath due to good electric conductive satellite surface components could in turn affect the main radiation lobe of TLC and Telemetry antennas, thus modifying its main propagation directions and finally increasing the microwave channel pathloss. The work reports the analysis of different nanostructured materials in the 2-8 GHz frequency range. The employed nanopowders are of carbon nanotubes, cobalt, argent, titanium, nickel, zinc, iron, bismuth, hafnium, in different weight percentages versus the hosting polymeric matrix. All the measurements are made by using vector network analyser and 50 ohm coaxial airline. The materials are ordered as a function of their electromagnetic losses capability by taking into account of both electric and magnetic properties.