

EMI Shielding in Carbon Based Nanocomposites

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Abstract : Carbon fiber reinforced polymer (CFRP) composites find wide use in the space and aerospace industries primarily due to their favourable strength-to-weight ratios. However, in spite of the impressive mechanical properties, their ability to shield sophisticated electronics from electromagnetic interference (EMI) is rather limited. As a result, metallic wire meshes or metal foils are often embedded in CFRP composites to provide adequate EMI shielding. This comes at additional manufacturing cost, increased weight and, particularly in cases of aluminium, increased risk of galvanic corrosion in the presence of moisture. In this work, we will explore ways of enhancing EMI shielding of CFRP laminates in the 8-12 GHz range (the so-called X-band), without compromising their mechanical and fracture properties, through minimal modifications to their current well-established fabrication protocol. The computational-experimental study of EMI shielding in CFRP laminates will focus on the effects of incorporating multiwalled carbon nanotubes (MWCNT) and conducting nanoparticles in different ways in the resin and/or carbon fibers. We will also explore the possibility of utilising the excellent absorbing properties of MWCNT reinforced polymer foams to enhance the overall EMI shielding capabilities.

Keywords : EMI shielding, X-band, CFRP, MWCNT

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