MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Specialised Technologies, Including Nanotechnology (8)

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IMITATION OF THE MATERIALS ELECTROMAGNETIC REFLECTION COEFFICIENT IN METROLOGICAL AND LOW RADAR OBSERVABILITY APPLICATIONS BY USING NANO COMPOSITES AND SWARM INTELLIGENCE ALGORITHM

Abstract

This work is focused on the capability to design materials having a particular reflection coefficient profile in the frequency range 2-18 GHz. Such materials are multilayer-structured, with several layers made of different nanocomposites. The swarm intelligence algorithm here used is the particle swarm optimization (PSO); the algorithm is integrated within the matlab code of the electromagnetic propagation engine. This mathematical model considers the feed forward propagation matrix applied for the multilayer design and optimization. The signature profile target of reflection coefficient is followed by the PSO and, at the end of the procedure, the number of required layers with associated thickness and nanocomposite type is provided. The nanocomposites dielectric parameters as a function of frequency are stored in a database accessed by the PSO. The possibility to imitate material existing in nature paves the potentiality to design materials for metrological applications. Moreover, this new technique can be effectively used in aerospace field for frequency selective materials design, in order to reduce the aircraft/spacecraft radar observability at certain frequencies.