

Abstracts

Design of Lightweight, Broad-Band Microwave Absorbers Using Genetic Algorithms (Jun./Jul. 1993 [T-MTT])

E. Michielssen, J.-M. Sajer, S. Ranjithan and R. Mittra. "Design of Lightweight, Broad-Band Microwave Absorbers Using Genetic Algorithms (Jun./Jul. 1993 [T-MTT])." 1993 Transactions on Microwave Theory and Techniques 41.6 (Jun./Jul. 1993 [T-MTT]): 1024-1031.

In this paper, a novel procedure for synthesizing multilayered radar absorbing coatings is presented. Given a predestined set of N_m available materials with frequency-dependent permittivities $\epsilon(f)$ and permeabilities $\mu_i(f)$ ($i = 1, \dots, N_m$), the proposed technique simultaneously determines the optimal material choice for each layer and its thickness. This optimal choice results in a screen which maximally absorbs TM and TE incident plane waves for a prescribed range of frequencies $\{f_1, f_2, \dots, f_{N_f}\}$ and incident angles $\{\theta_1, \theta_2, \dots, \theta_N\}$. The synthesis technique presented herein is based on a genetic algorithm. The present technique automatically places an upper bound on the total thickness of the coating, as well as the number of layers contained in the coating, which greatly simplifies manufacturing. In addition, the thickness or surface mass of the coating can be minimized simultaneously with the reflection coefficient. The algorithm was successfully applied to the synthesis of wide-band absorbing coatings in the frequency ranges of 0.2-2 GHz and 2-8 GHz.

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