Abstracts

Time-domain (transient) analysis of capacitive Jaumann absorbers

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Capacitive Jaumann Absorbers (C.J.A.) are widely used as electromagnetic wave absorbers in several applications, because in addition to bandwidth expanding, they reduce the spacing between sheets for specified bandwidth. Time-domain analysis of N-sheet C.J.A. and an optimum design for N (arbitrary)-sheet capacitive Jaumann electromagnetic (EM) absorber, using genetic algorithm will be presented. This algorithm is a random optimization method based on the genetic relation in the human being. We show that by using this algorithm and without imposing the double-notch design criteria the bandwidth of one or two-sheet C.J.A. can be expanded even more than 108% shown by Knott (1995). We also show that our results approaches Knott's results when we restrict the characteristic impedances and lengths of the lines to vary within a very short range. One, two and three-sheet C.J.A. are designed. The only restriction used is about the meaningful range for the design variables. The goal of this algorithm is to impose arbitrary restriction on the range of the variation of the variables. Finally, we obtain a 20-dB attenuation bandwidth more than 145% for one-sheet, 173% for two-sheet (compare with 108% obtained by Knott) and 193% for three-sheet capacitive Jaumann EM absorbers, with some acceptable short range for the variables. We design the one-sheet and two-sheet capacitive Jaumann absorbers at low frequency and the three-sheet at high frequency. The 20-db attenuation bandwidth obtained for the one-sheet and two-sheet capacitive Jaumann absorbers are respectively, from 10 to 77 MHz and from 4 to 61 MHz. For the three-sheet capacitive Jaumann absorber the 20-db attenuation bandwidth obtained is from 0.8 GHz to 280 GHz.

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