Abstracts

Optimization of microwave circuits using analytically calculated gradients in the finite element method

This paper presents a general method for analytically evaluating the gradients of cost-functions of microwave structures analyzed by the Finite Element Method (FEM). Conventional optimizers require a finite difference scheme to find the gradients of the cost function and thus two calculations per optimization parameter. The method described in this paper shows that the gradients can be evaluated analytically (exactly) from a single analysis run of the structure. Numerical results are presented for 2D microwave structures and compared with conventional finite differencing. Excellent agreement is found. The method can easily be extended to 3D problems with arbitrarily shaped mesh-simplexes and higher-order vector interpolation functions.

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