Abstracts

Numerical Determination of Potential in Inhomogeneous Dielectrics by Earnshaw's Theorem

J.A. Weiss and T.G. Bryant. "Numerical Determination of Potential in Inhomogeneous Dielectrics by Earnshaw's Theorem." 1970 Transactions on Microwave Theory and Techniques 18.9 (Sep. 1970 [T-MTT]): 595-601.

Earnshaw's theorem, a characterization of potential functions equivalent to Poisson's equation, expresses a relation between the value of the potential at a point and an average of the function over a spherical surface centered at the point. The theorem therefore lends itself to use in numerical computation of the potential. A formulation of the theorem is presented with particular reference to determination of the potential in a region which is inhomogeneously occupied by dielectric media. This provides a rigorous basis for the formulas used to determine the potential at points on a dielectric interface, in that it avoids the ambiguity which arises in the evaluation of the finite-difference approximation to the Laplacian at such points. The use of the formulation is illustrated by examples of computer-generated graphs giving the potential in the presence of irregular dielectric objects.

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