Abstracts

A New Technique for Measuring an Electromagnetic Field by a Coil Spring

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A thin coil spring whose length can be varied periodically by mechanical means has been used as a probe to measure the electric field intensity. The vibrating probe acts as a reradiating antenna with periodically varying length that modulates and scatters the component of the E/sup bar/ field which is parallel to the axis of the spring. The scattered signal is picked up by a receiving antenna (the sending antenna was used also as a receiving antenna) and amplified with an amplifier that is locked-in with the frequency of the mechanical vibration of the coil. Measurements were made with coil springs of three different dimensions, and a gain constant K, which should be independent of the product of the axial length of the coil and the magnitude of the vibration, was experimentally checked. Measurements of the field of a half-wave dipole antenna as measured with the spring probe are in general agreement with theory. An expression for the ratio between the scattered and incident waves is obtained based upon the field-pattern method and the approximations involved in the reciprocity-theorem method are clarified. It is also demonstrated (in the appendix) that the effective length of a thin helical antenna with a triangular current distribution equals one-half of the axial length of the helix.

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