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POWER FACTORS IN RADIO CIRCUITS.

BY N. H. WILLIAMS.

A CIRCUIT containing inductance and capacity in series, when used in continuous wave work, is seldom permitted to oscillate at its natural frequency because it is invariably coupled to some other circuit. Hence its power factor may differ widely from unity and the behavior of the system is largely determined by the power factor.

This paper presents a method of measuring the phase relations of two high frequency currents which involves the measurement of each of the two currents, their vector sum, and their vector difference. Two wire loops, each about 20 cm. in diameter, are placed in series and connected to a short constantine ribbon used as a heating element. This element is placed near to a thermal junction and the other junction of this circuit is placed near to a second heating element which is supplied with current from a dry cell. A sensitive galvanometer is used in connection with the thermal junctions. The positions of the two heating elements are adjusted so that they produce equal and opposite effects upon the galvanometer when they both carry the same current.

An auxiliary coil of a few turns is connected into the high frequency circuit. This coil is placed parallel to one of the loops and about 10 cm. from it. There is induced in the loop a current which is proportional to the initial high frequency current. The current from the dry cell is now adjusted to balance the effect of the high frequency current upon the thermal junction and galvanometer and the value of the induced high frequency current is read from the D.-C. ammeter.

A second coil of the same size carrying current of the same frequency may now be placed near the second loop. When the battery current is adjusted to balance the combined effects of the two currents, the ammeter reads their vector sum. By constructing the vector diagram, the phase difference may be measured. The angle thus measured is the complement of the angle whose cosine is the power factor of the oscillatory circuit.

By this means the relations of power factor to frequency, to coupling, and to resistance have been investigated.

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"J" RADIATION: A SUMMARY.

BY F. K. RICHTMYER.

THE frequent reference in the literature of X-rays to the existence of a "J" radiation, of shorter wave-length than the K radiation, seems to warrant a statement summarizing the evidence pro and con, particularly in view of a recent paper by Crowther (Phil. Mag. for November, 1921 (10)).

Previous to that of Crowther, the evidence in favor of the "J" radiation has been based almost entirely on apparent discontinuities in absorption as a function of wave-length. The present writer has shown (8, 9) that, when absorption measurements are made with monochromatic radiation and with a precision of the order of one per cent., these discontinuities disappear.

Crowther bases his evidence for the existence of "J" radiation on the decrease in "hardness" of scattered radiation as compared with the primary beam transmitted at 45° through a thin sheet of aluminum, the scattered beam being measured at 90° from the primary. Since Crowther did not use monochromatic radiation his results (his published data are very meager) can readily be explained by assuming that the scattering coefficient is a function of wave-length.

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