BUILDING-UP OF A SELF-OSCILLATION IN AN OSCILLATION CIRCUIT INCLUDING A PERIODICALLY VARYING INDUCTANCE. *

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(1) The fact that a self-oscillation can be produced by means of a mechanically oscillating system having a periodically varying stiffness with just twice its frequency, has been well studied by Rayleigh and others.

Winter-Günther has pointed out recently that this interesting phenomenon happens also in an oscillation circuit, when the inductance L varies periodically as represented by

$$L = L_0 + l \cos \omega_0 t \quad \text{.....(1)}$$

As one of the typical examples of such inductance, the authors have made use of a high-frequency alternator of inductor type. The present paper deals with the building-up of these oscillations with some experimental results.

(2) We consider the manner in which how the equivalent negative resistance necessary for the oscillation production can be introduced from the variation of the inductance.

Equation (11) expresses the effective impedance of an inductance L for the special case of half the frequency. Moreover the amplitude of the third harmonic may be easily obtained by Eq. (16). (See p. 202.)

(3) Experimental results are discussed in this chapter. Fig. 5 shows the circuital connection for this experimental. The self-inductance and the effective resistance of the armature winding of the high frequency generator are shown in Fig. 4.

It is interesting and important to see how much alternating power can be produced by this principle of an oscillation production. As shown in the table the output amounts to several hundred watts in our experiment.

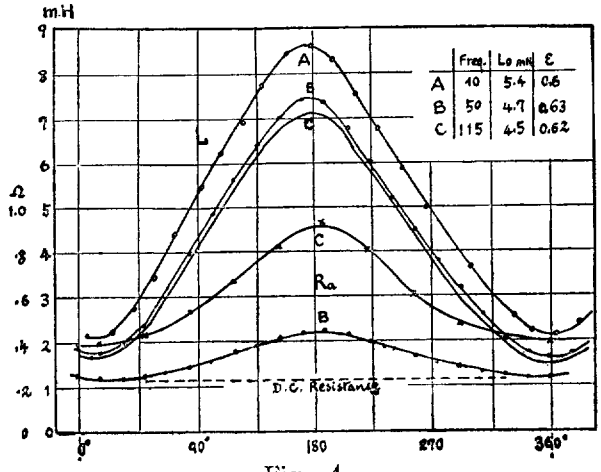

Fig. 4

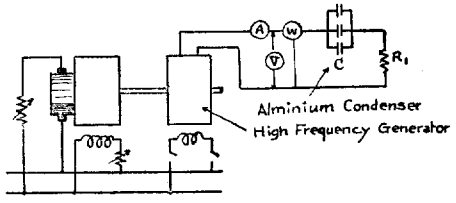

Fig. 5

(4) It is experimentally shown that this oscillation can be much easily produced by impressing a small E.M.F. of a frequency, which is near that of the self-oscillation.

* This investigation was made in Tohoku Imperial University with aid from SAITO-HO-ONKAI.

AN EXAMPLE OF SPEED CONTROL OF THREE-PHASE SQUIRREL CAGE MOTORS THROUGH UNBALANCED VOLTAGE.

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A speed control system of three-phase squirrel cage motors by reducing one phase voltage with a single-phase autotransformer is discussed. Current locus, torque characteristics, and approximate derivation of the autotransformer kilovolt-ampere are given and explained.