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COMBINED OPERATION OF TWO IMPULSE-EXCITED OSCILLATORS
WITH ENERGY STORAGE IN THE INDUCTIVE LOAD

By

G. A. Sipaylov, A. V. Loos

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COMBINED OPERATION OF TWO IMPULSE-EXCITED OSCILLATORS
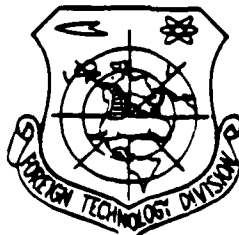WITH ENERGY STORAGE IN THE INDUCTIVE LOAD

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U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	*А а*	A, a	Р р	*Р р*	R, r
Б б	*Б б*	B, b	С с	*С с*	S, s
В в	*В в*	V, v	Т т	*Т т*	T, t
Г г	*Г г*	G, g	У у	*У у*	U, u
Д д	*Д д*	D, d	Ф ф	*Ф ф*	F, f
Е е	*Е е*	Ye, ye; E, e*	Х х	*Х х*	Kh, kh
Ж ж	*Ж ж*	Zh, zh	Ц ц	*Ц ц*	Ts, ts
З з	*З з*	Z, z	Ч ч	*Ч ч*	Ch, ch
И и	*И и*	I, i	Ш ш	*Ш ш*	Sh, sh
Й й	*Я й*	Y, y	Щ щ	*Щ щ*	Shch, shch
К к	*К к*	K, k	Ъ ъ	*Ъ ъ*	"
Л л	*Л л*	L, l	Ы ы	*Ы ы*	Y, y
М м	*М м*	M, m	Ь ь	*Ь ь*	'
Н н	*Н н*	N, n	Э э	*Э э*	E, e
О о	*О о*	O, o	Ю ю	*Ю ю*	Yu, yu
П п	*П п*	P, p	Я я	*Я я*	Ya, ya

*ye initially, after vowels, and after ъ, ь; e elsewhere.
When written as ё in Russian, transliterate as yё or ё.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sin	sin⁻¹
cos	cos	ch	cosh	arc ch	cos⁻¹
tg	tan	th	tanh	arc th	tan⁻¹
ctg	cot	cth	coth	arc cth	cot⁻¹
sec	sec	sch	sech	arc sch	sec⁻¹
cosec	csc	csch	csch	arc csch	csc⁻¹

Russian	English
rot	curl
lg	log

GRAPHICS DISCLAIMER

All figures, graphics, tables, equations, etc. merged into this
translation were extracted from the best quality copy available.

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COMBINED OPERATION OF TWO IMPULSE-EXCITED OSCILLATORS WITH ENERGY
STORAGE IN THE INDUCTIVE LOAD.

G. A. Sipaylov, A. V. Loos.

(It is presented by the scientific seminar of the departments of
electrical machines and general/common/total electrical engineering).

Existing diagrams of energy storage from impulse-excited
oscillator in inductive load for time of many half-waves emf. one
sign they possess the essential deficiency/lack, which consists in
the fact that the time of conservation of energy between two cycles
of accumulation is sufficiently great. This leads to the considerable
energy losses in the effective resistance of duct/contour
"load-short" with [1, 2].

Time of conservation of energy between two cycles of
accumulation is possible substantially to shorten, if to carry out
energy transfer for time of each half-period emf. Most simply it is

possible this to carry out by the use/application of two-phase
impulse-excited oscillator, emf. phases of which they are shifted 180
electrical degrees. In this case possibly also the use of two
single-phase impulse-excited oscillators, which have the analogous of
the phases between emf.

Schematic diagram of work of two single-phase generators of
inductive load is given in Fig. 1, where УГ-1, УГ-2 - single-phase
generators of striking power, K-1, K-2, K-3 - arc-free ion-mechanical
switching devices/equipment, L, $r_н$, $L_г$, $r_г$ - parameters of load and
generators.

Character of change in currents and emf of generators is shown
in Fig. 2. The work of diagram is realized as follows. In the initial
state K-1, K-2, K-3 are opened. Generators idle. At the moment of
time t = 0 closing/shorting K-1 we realize start of generator УГ-1 of
the load.

Character of change in current   _   is determined from solution
of equation (1):

$$E_г \sin \omega t \quad L \frac{di}{dt} \quad + L_г \frac{di}{dt} \quad - r_н i_н \quad (1)$$

At the moment of time t_1, when the current of load reaches maximum,

we produce closing/shorting K-2. The character of a change in the currents in this case is determined by the solution of equations (1), (2) and (3):

$$E_m \sin(\omega t - \pi) = L_r \frac{di_r}{dt} - r_r i_r - L_H \frac{di_H}{dt} + r_H i_H \qquad (2)$$

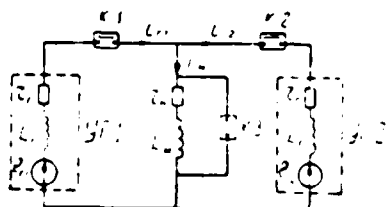$$i_H = i_{c1} - i_r \qquad (3)$$

Fig. 1. Schematic diagram of work.

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From this point on, of time begins rapid increase of current i_2 and reduction in current i_1 At the moment of the transition/junction of current i_1 through zero is produced interrupting K-1. The current of load in the time interval from t_1 to t_2 remains in effect constant. From the moment/torque of time t_2 transient process in the diagram is described by equation (2). The current of load again grows/rises, and at the moment of achieving its maximum t_3 it is produced closing/shorting K-1. The current of generator i_1 rapidly decreases, and at the moment of its transition/junction through zero we produce the cutoff/disconnection of generator УГ-2 with interrupting K-2. At this time the current of generator УГ-1 sharply grows/rises. In the time interval from t_3 to t_4 the current in the load is kept constant, and then again grows/rises. Further processes

in the diagram are repeated. The maximum value of current, which can
be obtained in the load, is equal to the impact short-circuit current
of generator.

For purposes of determination of the possibility of diagram in
question and its comparison with diagram of energy storage from one
impulse-excited oscillator were carried out its investigations
according to equations (1), (2), (3). The investigations of the work
of diagram were carried out on analog computer MHБ-1 with the
use/application of a program unit, which ensures an automatic change
in the block diagram of the solution with respect to changes in the
diagram being investigated. The mathematical model of the diagram in
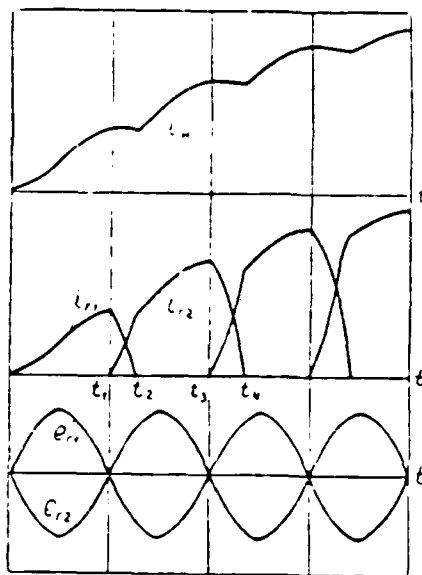question is represented in Fig. 3.

Fig. 2. Character of change in currents and emf.

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During research on the schemes value of relation $\frac{L_u}{L_r}$ varied within the limits of 1-10. The relationships/ratios between active and inductive reactances were selected as being equal to $\frac{r}{x} = \frac{r_u}{x_u} = 0.05$ The results of these investigations are represented in Table 1.

As can be seen from represented Table, time of

reaching/achievement of current, equal to 0.9 $I_{y,1}$ with work of
diagram in question is more than twice less than with energy storage
in inductive load from one impulse-excited oscillator. Scattering
active energy in the resistors/resistances of diagram in this case
will be also less than approximately two times.

Thus, with work according to this diagram more than twice
grows/rises power of entire installation. Fig. 4 gives the
oscillogram of the solution when $L_x/L_i = 0.5$

Use/application of this diagram can prove to be advisable in
those cases, when considerable increase in speed of transmission of
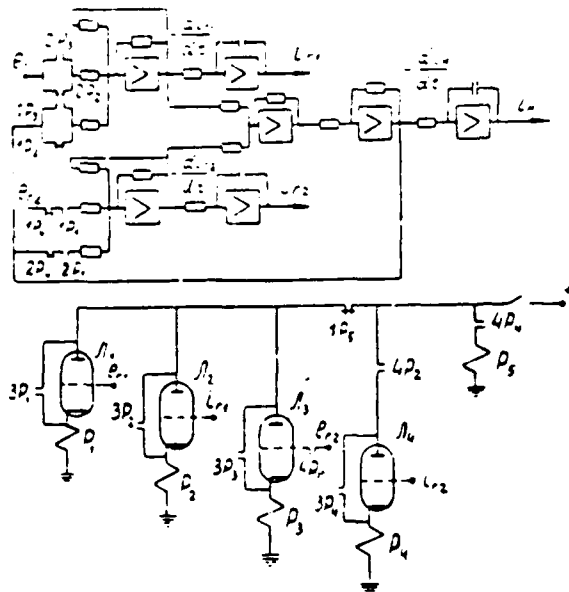energy to inductive load is necessary.

Fig. 3. Mathematical model of diagram.

Table 1.

L. L.	1	2.5	5	7.5	10	(1) Примечание
						(2) Два 1 фазных гене ратора
						(3) Однофазный генера ротор

Key: (1). Note. (2). Two 1-phase generators. (3). Single-phase generator.

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Fig. 4. Oscillogram of solution on AVM.

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С ... ... генератора в ...
... . ТПИ, т ... ...
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