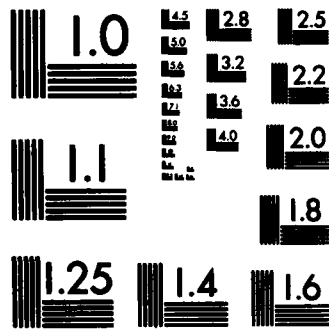AD-A133 786   A MATHEMATICAL INVESTIGATION OF THE INDUCTION   1/1
               ACCELERATION OF CONDUCTORS(U) FOREIGN TECHNOLOGY DIV
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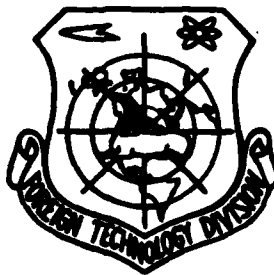NATIONAL BUREAU OF STANDARDS-1963-A

FOREIGN TECHNOLOGY DIVISION

A MATHEMATICAL INVESTIGATION OF THE INDUCTION ACCELERATION
OF CONDUCTORS

by

A.N. Andreyev, V.N. Bondaletov

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By: A.N. Andreyev, V.N. Bondaletov

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А а	*А а*	A, a	Р р	*Р р*	R, r
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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	*Й 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 sh	$\sinh^{-1}$
cos	cos	ch	cosh	arc ch	$\cosh^{-1}$
tg	tan	th	tanh	arc th	$\tanh^{-1}$
ctg	cot	cth	coth	arc cth	$\coth^{-1}$
sec	sec	sch	sech	arc sch	sech^{-1}
cosec	csc	csch	csch	arc csch	csch^{-1}

Russian	English
rot	curl
lg	log

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

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A Mathematical Investigation of the Induction Acceleration
of Conductors

Andreyev, A. N.; Bondaletov, V. N. - In the collection "High-
Voltage Pulse Technology". Issue 1, Cheboksary, 1972,
p. 27, 65.

This article is dedicated to the establishment of the optimum
conditions of the process of the induction acceleration of conductors
and to the determination of the parameters of an installation, which
ensures the given acceleration (speed with a given mass) with minimum
energy expenditures. The investigation of the induction acceleration
of conductors, conducted with the aid of mathematical modelling, shows,
that for purposes of free induction acceleration there are optimum
voltage and energy storage capacity, mass, inductance, and geometrical
dimensions of the hurled body. An overall decrease in the gap between
the inductor and the conductor and the internal inductance of the in-
stallation is desirable for increasing the efficiency of the energy
conversion of the source. The switching of additional inductance into
the circuit of the accelerated body leads to a decrease in the efficien-
cy of the acceleration process, although this decrease is not very sharp,
which makes it possible to increase the speed of the conductor in ac-
cordance with the condition of maximum heating. The most limiting
factors in achieving high efficiencies in the induction acceleration
facilities are the active resistances of the inductor and the acceler-

1

ated body. For increasing the efficiency it is necessary to use con-
ductors with high conductivity or superconductors as the materials of
the inductor and the accelerated body. The shunting of the capacitors
at the moment of the passage of the voltage through the zero value can
lead to an increase in the efficiency only with small active resistan-
ces. The optimum acceleration conditions, other factors being equal,
are obtained with the employment of a single-layer coil as the induc-
tor. For attaining high efficiencies the path travelled by the accel-
erated body should exceed (0.25-0.3) D_{cp}, where D_{cp} is the average
diameter of the coil.

Illustrations - 16, bibliographical references 9.

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