89427

Effect of a transverse magnetic...   S/197/61/000/001/001/002
                                          B124/B203

passage of a current of up to 1000 a between the electrodes of the pump,
and an induction of about 1500 gauss between the magnet poles, the mean
velocity in the canal attained 20 cm/sec. The Reynolds number varied in
the experiments from Re = 6680 to Re = 18400, and the Hartman number from
M = 0 to M = 41.5. A modified Pitot tube was used to measure the velocity
at different points of the canal. Fig. 3 gives some results of these
measurements. Fig. 4 shows the dependence of the uniform velocity dis-
tribution coefficient $\psi = U_\delta/U_{max}$ (5) (U_δ = velocity near the wall,
U_{max} = velocity in the flow axis) on the ratio M^2/Re. Fig. 5 shows the
velocities measured in the horizontal plane at different Hartman numbers,
and Fig. 6 the change of the uniform velocity distribution coefficient
with the field stress in the artificially roughened canal. The rate of
dissolution of lead in a mercury flow is greatly slowed down by the
magnetic field. There are 7 figures, 1 table, and 10 references:
5 Soviet-bloc and 5 non-Soviet-bloc.

ASSOCIATION: Institut fiziki AN Latv.SSR
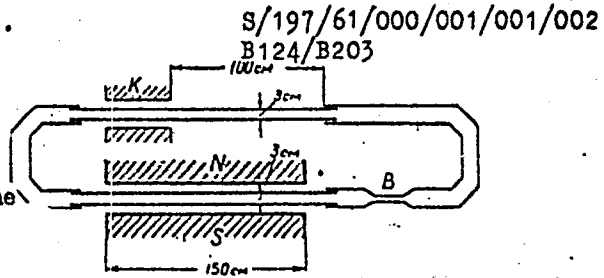   (Institute of Physics of the AS Latviyskaya SSR)
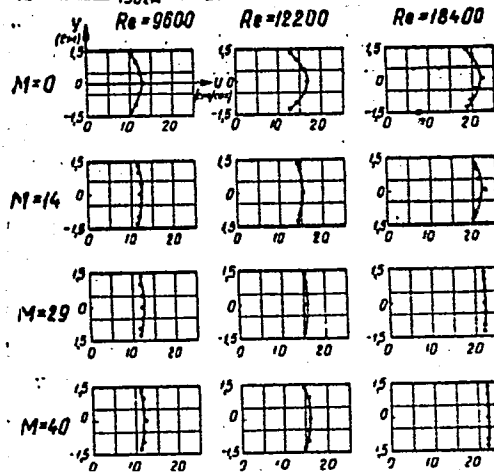
Card 3/5

89427

Effect of a transverse magnetic...

SUBMITTED: August 5, 1960

Legend to Fig. 2: Diagram of the
experimental apparatus.

Legend to Fig. 3: Velocity distribu-
tion in a canal of smooth walls as
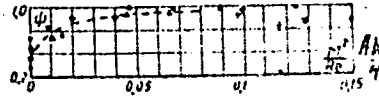dependent on the field stress.

Card 4/5

Effect of a transverse magnetic...

89427
S/197/61/000/001/001/002
B124/B203

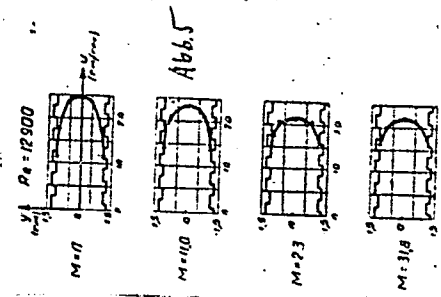Legend to Fig. 4: Change of the
uniform velocity distribution
coefficient in a canal of smooth walls
as dependent on the field stress

Legend to Fig. 5: Velocity distribu-
tion in an artificially roughened canal
as dependent on the field stress

Legend to Fig. 6: Change of the uniform
velocity distribution coefficient
in an artificially roughened canal as
dependent on the field stress
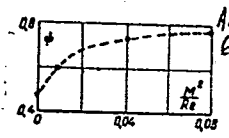
Card 5/5

BRANOVER, G. (Riga); LIELAUSIS, O. (Riga)

Effect of transverse magnetic field on the internal structure and
hydraulic resistance in turbulent flows of liquid metal. Vestis Latv
ak no.1:59-66 '61.   (EEAI 10:9)

1. Akademiya nauk Latviyskoy SSR, Institut fiziki.

(Magnetic fields)   (Liquid metals)

ACCESSION NR: AT4042282   S/0000/63/003/000/0059/0063

AUTHOR: Branover, G. G., Liyelausis, O. A. (Candidate of physico-mathematical sciences)

TITLE: Characteristics of transverse magnetic field effects on turbulent flows of liquid metal at various Re numbers

SOURCE: Soveshchaniye po teoreticheskoy i prokladnoy magnitnoy gidrodinamike. 3d, Riga, 1962. Voproxy* magnitnoy gidrodinamiki (Problems in magnetic hydrodynamics); doklady* soveshchaniya, v. 3. Riga, Izd-vo AN LatSSR, 1963, 59-63

TOPIC TAGS: turbulent flow, liquid metal flow, transverse magnetic field, drag coefficient, Re boundary value, magnetic field effect, conducting fluid flow, Reynolds number, hydromagnetics

ABSTRACT: To supplement existing reports for the ranges Re_{cr} to 1200 and 7500 to 30,000, the authors measured the effects of a transverse magnetic field on drag coefficients for Re=1410 - 3460 (M=0 - 10) in a channel with walls of non-conducting material (0.1 x 4.0 cm; stabilization sector 6 cm, operating sector 9 cm). The results served to establish a boundary value of $Re \approx 2500$, below and above which λ_m decreases and increases,

Card 1/2

ACCESSION NR: AT4042282

respectively, and the conclusion is drawn that variations in drag coefficient, when a transverse magnetic field is applied, are always in the direction of its critical values outside the field. Formulas are given for calculating Re_{cr} for a plane-parallel flow in a transverse field and λ for $Re > 2500$. It is pointed out that the effects of a field must be considered in design calculations calling for $M^2/Re > 10^{-3}$ to 10^{-2}. Orig. art. has: 3 graphs and 5 equations.

ASSOCIATION: none

SUBMITTED: 04Dec63

ENCL: 00

SUB CODE: ME   NO REF SOV: 004   OTHER: 004

Card 2/2

ACC NR: AP6034580   SOURCE CODE: UR/0382/66/000/003/0055/0063

AUTHOR: Branover, G. G.; Shcherbinin, E. V.

ORG: none

TITLE: Magnetohydrodynamic jet flow in a bounded region

SOURCE: Magnitnaya gidrodinamika, no. 3, 1966, 55-63

TOPIC TAGS: MHD flow, Reynolds number, weak magnetic field, transverse magnetic field, turbulent flow

ABSTRACT: Initial experiments to study jet flows of magnetohydrodynamic fluids in bounded regions, with walls that do not follow free streamlines, are described and the results are given. The flow chamber and channels are shown in Fig. 1. Liquid mercury was used as the working fluid with induction pumps maintaining flow speed within 2%. The flow conditions were chosen so that the Reynolds number ranged from 5750 to 18,600 and the Hartmann number ranged from 0 to 296. A most detailed investigation was conducted for Reynolds number 5760 and the corresponding results are given in graphs showing velocity profiles at various positions in the flow. It is shown that in weak magnetic fields applied transverse to the flow, two unsymmetric vortices appear at the

UDC: 5J8.4

Card 1/2

ACC NR₁ AP6034580

Fig. 1.

induction pump
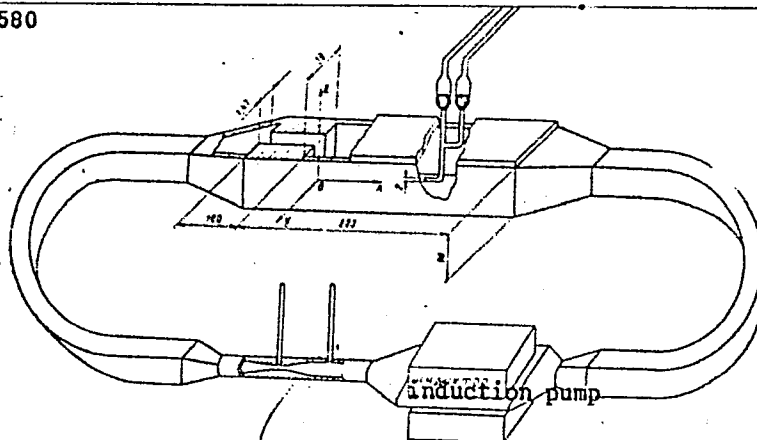
nozzle exit, then the stream interacts with the walls and some reverse flow appears gradually changing to typical turbulent flow in the channel. As the Hartmann number increases, complete stream symmetry appears. Some regions of instability were noted (shown in a three-dimensional plot) which were found to decay into characteristic flow under conditions of applied magnetic field, quite different from the normal flow. The results were parametrized and plotted for comparison with the scaling law derived for the flows studied in this work. Orig. art. has: 7 figures, 4 formulas.

SUB CODE: 20/   SUBM DATE: 07Dec65/   ORIG REF: 006/   OTH REF: 005

Card 2/2

ACCESSION NR: AT4042284   S/0000/63/003/000/0077/0080

AUTHOR: Branover, G. G., Dukure, R. K.

TITLE: Effect of roughness of the channel walls on drag during turbulent flow of liquid metal in a transverse magnetic field

SOURCE: Soveshchaniye po teoreticheskoy i prikladnoy magnitnoy gidrodinamike. 3d, Riga, 1962, Voprosy* magnitnoy gidrodinamiki (Problems in magnetic hydrodynamics); doklady* soveshchaniya, v. 3. Riga, Izd-vo AN LatSSR, 1963, 77-80

TOPIC TAGS: turbulent flow, liquid metal flow, channel roughness, transverse magnetic field, drag coefficient, Stewart number, hydromagnetics

ABSTRACT: The authors measured the drag coefficients for Hg forced by an induction pump through channels of organic glass with wall roughness simulated by celluloid disks. The results are calculated from pressure differentials according to

$$\lambda_m = \frac{2\Delta p R}{\rho v^2 l}, \qquad (1)$$

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ACCESSION NR: AT4042284

where P=density of the liquid, v=average flow velocity, R=hydraulic radius, Δp=pressure differential over channel length 1, λ_m = drag coefficient in the field, and are shown graphically (see Fig. 1. in the Enclosure). Orig. art. has: 3 figures and 2 equations.

ASSOCIATION: none

SUBMITTED: 04Dec63   ENCL: 01

SUB CODE: ME   NO REF SOV: 003   OTHER: 000

Card 2/3
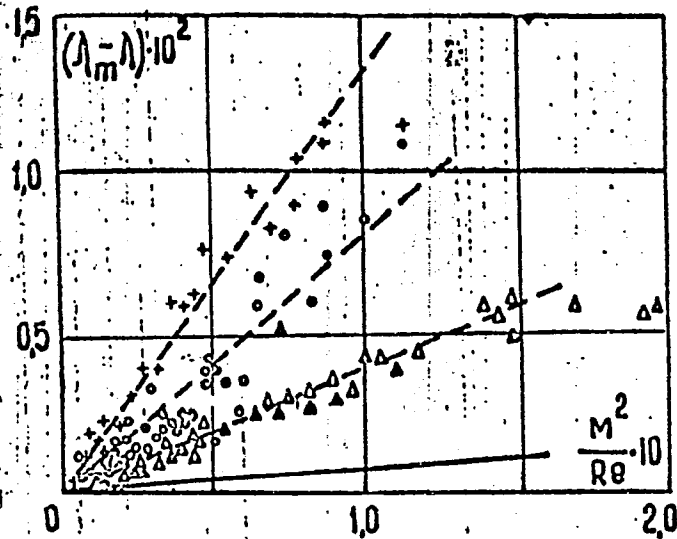
Fig. 1. Variation in the drag coefficient in relation to Stewart's number: + - channel
width a = 2.5 cm, height of plastic dis k = 0.2 cm;
⊘ — a = 0,30 cм; k — 0,025 см; O — a = 0,15 см, k = 0,025 см; △ — a —
— 1,0 см, k — 0,045 см; ▲ — a — 0,5 см, . k — 0,015 см.

Card 3/3

BRANOVER, G.G.; DUKURE, R.K.; KIRKO, I.M.; LIELAUSIS, O.A.; SHCHERBININ, E.V.
(Riga)

"On hydraulic laws of turbulent flows of liquid metals in magnetic fields"

report presented at the 2nd All-Union Congress on Theoretical and Applied
Mechanics, Moscow, 29 January - 5 February 1964

L 32854-65   EWT(1)   IJP(c)   8/0170/65/008/001/0114/0115
ACCESSION NR: AP5005770

AUTHORS: Branover, G. G.; Tsinober, A. B.; Shcherbinin, E. V.

TITLE: T r a n s formation of turbulent flow structure of mercury in a transverse
magnetic field behind sudden expansion

SOURCE: Inzhenerno-fizicheskiy zhurnal, v. 8, no. 1, 1965, 114-115

TOPIC TAGS: turbulent flow, magnetic field, mercury, velocity profile, Reynolds
number, Hartman number

ABSTRACT: The hydromagnetic flow of mercury expanding from a 0.2 x 10-cm slit into
a 2 x 10-cm channel (120 cm long) was studied experimentally. A transverse magnetic
field was applied along the channel length, and velocity profiles were measured with
Pitot tubes. The flow was turbulent with $Re = 3.35 \times 10^5$. The magnetic field was
found to flatten the velocity profiles noticeably (see Fig. 1 of the Enclosure) and
to reduce the size of the vortex zone in the vicinity of the expansion. Orig. art.
has: 2 figures.   [04]

ASSOCIATION: none
SUBMITTED: 22 Feb64   ENCL: 01   SUB CODE: ME
                                                            ATD PRESS: 3205
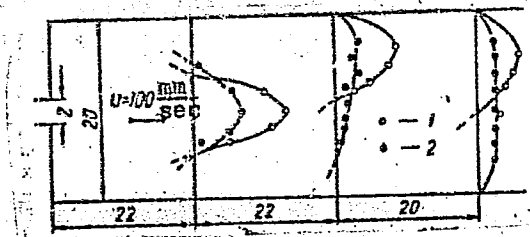NO REF SOV: 004   OTHER: 002
Card 1/2

Fig. 1. Expansion of a jet with and without a magnetic field

Hartman number: 1 - M = 0; 2 - M = 88.2.

Card 2/2

L 27849-65   EWT(1)/EWP(m)/EPA(s)-2/EWT(m)/EPA(sp)-2/EPF(n)-2/EWG(v)/EWA(d)/
EWR/EPA(w)-2/T-2/EWP(t)/EPA(bb)-2/EWP(b)/EWA(m)-2   Pd-1/Pab-10/Pe-5/Ps-4/Pt-10/
Pi-4/Pu-4   IJP(c)   JD/WW/JG   S/0057/65/035/002/0235/0241

ACCESSION NR: AP5005223

AUTHOR: Branover, G.G.; Liyelausin, O.A.

TITLE: Some peculiarities of the influence of a transverse magnetic field on the
turbulent flow of a liquid metal at various Reynolds numbers

SOURCE: Zhurnal tekhnicheskoy fiziki, v.35, no.2, 1965, 235-241

TOPIC TAGS: magnetohydrodynamics, mercury, Reynolds number, turbulent flow, velo-
city profile, magnetic field

ABSTRACT: The flow of mercury in a transverse magnetic field was investigated ex-
perimentally. The apparatus and methods of measurement are not discussed in detail
because they have been previously described in several Latvian publications. The
investigation was undertaken in part because of the contrary dependences of flow
resistance on the magnetic field, found at low Reynolds numbers by Hartman and at
high Reynolds numbers by Murgatroyd and by Brouillette and Lykodes. The intermedi-
ate range of Reynolds numbers was covered by the present experiments, and it was
found that when Reynolds number was 2160 the flow resistance was independent of
the magnetic field in the region of turbulent flow. In all cases laminar flow set

Card 1/3

L 27849-65

ACCESSION NR: AP5005223

in at the critical Reynolds number $250M^2 \tanh M/(M-\tanh M)$, where M is Hartman's number and is proportional to the magnetic field. The difference between the magnetic field dependences of the flow resistance in turbulent flow at high and low Reynolds numbers is ascribed to the different relative importance of the Hartman effect (flattening of the velocity profile) and the magnetic suppression of turbulence in the two regions. The existence of the Hartman effect was verified directly by velocity profile measurements with a modified Pitot tube. The flow resistance was measured at Reynolds numbers from 6680 to 14,900 in smooth and rough channels, and it is concluded that the flow resistance is given with engineering accuracy by $L_0(1 + fM^2/R)$, where L_0 is the flow resistance at zero field, R is Reynolds number, and f is 2 for smooth walls and of the order 10 for very rough walls. Experiments were also performed concerning the behavior of the flow in a channel of which the width changes suddenly, and these are discussed briefly. Orig.art.has: 10 formulas and 4 figures. [02]

Card 2/3

L-27849-55
ACCESSION NR: AP5005223

ASSOCIATION: Institut fiziki AN Latviyskoy SSR (Institute of Physics, AN Latvian SSR)

SUBMITT D: 13Mar64   ENCL: 00   SUB CODE: ME,EM

NR REF SOV: 006   OTHER: 014   ATD PRESS: 3193

Card 3/3

L 15650-66   EWT(1)/EWP(m)/EWA(d)/ETC(m)-6   WW
ACC NR: AP6003222   SOURCE CODE: UR/0382/65/000/004/0154/0154

AUTHOR: Branover, G. G.; Shcherbinin, E. V.

ORG: none

TITLE: The behavior of a stream in a channel with nonconducting walls in a trans-verse magnetic field

SOURCE: Magnitnaya gidrodinamika, no. 4, 1965, 154

TOPIC TAGS: plasma flow, plasma magnetic field, plasma injection

ABSTRACT: Plane streams of mercury passed into a rectangular channel with insulated walls were found to exhibit unusual behavior with the imposition of a transverse magnetic field. The initial plane stream ceases almost entirely after a very short distance and the entire flow is concentrated in two narrow layers which cling to the walls of the channel and are parallel to the magnetic field. This flow structure is maintained over a considerable distance. A more thorough analysis of this phenomenon will be published in a future issue of *Magnitnaya gidrodinamika*.

SUB CODE: 20/   SUBM DATE: 00/   ORIG REF: 000/   OTH REF: 000
                                           UDC: 538.4
Card 1/1

L 24162-66   EWT(m)/EPF(n)-2/EWP(t)   IJP(c)   JD/WW/JG
SOURCE CODE: UR/0382/65/000/001/0115/0122

ACC NR: AP6015170

AUTHOR: Branover, G. G.; Bugrov, N. S.; Kirko, I. M.; Livelausis, O. A.;
Molochnikov, M. V.

ORG: none

TITLE: Experiments on a pressure-free loop for liquid pig iron

SOURCE: Magnitnaya gidrodinamika, no. 1, 1965, 115-122

TOPIC TAGS: pig iron, molten metal, magnetic field

ABSTRACT: By means of experiments on a pressure-free loop for liquid pig iron, the
approximate dependence of the capacity of the electromagnetic trough on the current
load and the angle of rise have been determined. The required current loading has
also been found for the start of transit flow. It was shown that the flux in the
trough was steady. The loop consisted of a U-shaped channel connected to a bath of
liquid metal. The metal moved along the loop under the action of a travelling mag-
netic field. Orig. art. has: 5 figures and 10 formulas. [JPRS]

SUB CODE: 13, 20 / SUBM DATE: 24Sep64 / ORIG REF: 005

Card 1/1

UDC: 538.4: 669.163.1

ACC NR: AP7000368   SOURCE CODE: UR/0413/66/000/022/0154/0154

INVENTOR: Kirko, I. M.; Branover, G. G.; Ioffe, B. A.; Saulite, U. A.

ORG: none

TITLE: Plate-type hermetic pump. Class 59, No. 188847. [announced by the Institute of Physics, AN Latvian   SSR (Institut fiziki AN Latviyskoy SSR)]

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 22, 1966, 154

TOPIC TAGS: pump, fluid pump, hydraulic pump

ABSTRACT: An Author Certificate has been issued for a plate-type hermetic pump consisting of a pipe-line inductor, plate holders, and plates. To simplify its design, the casing is made in the form of a closed annular duct. To assure its tight closing and for the automatic compensation of hydraulic-pressure wear on the operating plates' surfaces the plates' external axis of rotation is relative to the plate holder.

SUB CODE: 13/ SUBM DATE: 20Jul64/

Card   1/1   UDC: 621.66-213

124-58-9-9867

Translation from: Referativnyy zhurnal, Mekhanika, 1958, Nr 9, p 57 (USSR)

AUTHOR: Branover, G. G.

TITLE: Investigation of the Drowning of a Surface Jump (Issledovaniye
              zatopleniya poverkhnostnogo pryzhka)

ABSTRACT: A relationship is offered linking the magnitude of the piezo-
              metric height h_o underneath the high-velocity stream at the
              point of its take-off from the bucket for the moment of the
              drowning of the surface jump. The relationship is obtained by
              applying the law of the quantity of motion to a segment contained
              between the constricted section on the bucket, the free surface,
              the section at the point of inflection of the stream, and the bound-
              ary between the transition stream and the eddy formation.
              Therein the hydrostatic law is assumed to prevail for the
              pressure distribution in the section on the bucket and at the
              point of inflection of the stream; the distance of the point of
Card 1/2   inflection from the bucket and the friction force on the boundary

124-58-9-9867

Investigation of the Drowning of a Surface Jump

of the transition stream are determined from experimental data. In addition it is assumed that at the moment of drowning the stream will become vertical at the point of inflection. A relationship is also proposed for the magnitude of the pressure under the stream, h_o, and the depth of the tailwater, t_2, at the moment of the drowning of the surface jump; this relationship is likewise obtained through the use of the law of the quantity of motion. A graph is provided to facilitate the calculations according to the cubic law obtained. Bibliography: 10 references.

T. N. Astaficheva

1. Hydrodynamics--USSR   2. Water--Motion   3. Mathematics--Applications

Card 2/2

BRANOVER, G.G., Cand, Tech Sci--(diss' "Study of flooding of the surface jump." Riga, 1958. 11 pp, 140 copies (KL, 31-58, 102)

—46—

33258

26.2331
11.4000
26.2354

S/668/61/000/012/002/004
B102/B138

AUTHORS: Branover, G. G., Kirko, I. M., Liyelausis, O. A.

TITLE: Experimental study of the influence of a transverse magnetic
             field on the velocity distribution in a mercury flow

SOURCE: Akademiya nauk Latviyskoy SSR. Institut fiziki. Trudy.
             no. 12. 1961, 167 - 175

TEXT: The hydrodynamic effects in liquid metals in the presence of a
transverse magnetic field were studied by means of an annular channel,
shown in section in Fig. 2. Magnetic core and coil are designed to pro-
vide induction heating of the former up to $150^{\circ}C$ when a 50-cps voltage of
380 v is connected. The channel is thus suitable for experiments with Hg
and liquid Na. In the space for the actual channel, the H-field is rela-
tively uniform, its radial and vertical variations are about 10% and only
in about 1 cm of the upper part does H increase strongly. A solenoid   -
current of 40 a induces a field of about 3000 oe. The mercury in the
stationary channel was set in motion by a d-c pump. Two 15 cm long copper
electrodes (bottom and top electrode) passed a current of up to 200 a
Card 1/2 3

Experimental study of the ...

through the mercury in the channel, transverse to its direction of flow.
The velocity distributions were measured for several Reynolds and Hart-
mann numbers (Re, M) and the coefficient of resistance (C_f) was determined.

A modified Pitot tube was used to measure the velocities; the velocity
could be read from the scale, since $U = 13.6 \sqrt{\Delta h_2}$ held.
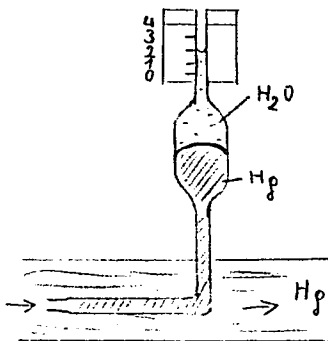
h_2 is the increase in water level due to flow
pressure. The velocity diagrams were drawn for
M/Re values between $0.58 \cdot 10^{-3}$ and $4.1 \cdot 10^{-3}$
($M = BR \sqrt{\sigma/\eta}$, B mean inductance in the channel,
σ electrical conductivity of Hg). At low M/Re
the diagrams were strongly dependent on the
curvature of the channel. The unevenness of
the velocities decreased with increasing magne-
tic induction, until constant velocity was
established at $M/Re = (3-4) \cdot 10^{-3}$. The resist-
ance coefficient $C_f = \tau_0/(\rho_1 U_0^2/2)$ (τ_0 - shear-

Card 2/$\emptyset$ 3

Experimental study of the ...

ing stress at the wall, U_o – velocity at axis of flow, ρ_1 – Hg density)
was determined between $M/Re = 0 - 4.4 \cdot 10^{-3}$. It was found to vary between
≈ 2 and ≈ 4 and can be assumed to be constant within the measuring error
limits. There are 5 figures and 3 references; 1 Soviet and 2 non-Soviet.
The reference to the English-language publication reads as follows: W.
Murgatroyd. Philosophical Magazine, 44, 1348, 1953.

Card 3/8 3

L 15719-63   EPR/EPA(b)/EWT(1)/EPF(n)-2/EWG(k)/EWP(q)/EWT(m)/BDS/T-2/ES(s)-2/
ES(w)-2   AFFTC/ASD/ESD-3/AFWL/IJP(C)/SSD   Ps-4/Pd-4/Pu-4/Pz-4/Pab-4/Pt-4/Pi-4/
ACCESSION NR: AR3002658   Po-4   WW/JD/AT/JG   s/0124/63/000/005/B013/B013

SOURCE: Rzh. Mekhanika, Abs. 5B62

AUTHOR: Branover, G.G.; Lielausis, O. A.

TITLE: Results of an experimental study of turbulent flow of liquid metal in a
transverse magnetic field

CITED SOURCE: Sb. Vopr. magnitn. gidrodinamiki i dinamiki plazmy. v. 2. Riga,
AN LatvSSR, 1962, 575-581

TOPIC TAGS: channel flow, turbulent flow, Hartman number, liquid metal, mercury,
magnetic field

TRANSLATION: A study was made of the effect of a transverse magnetic field on
the distribution of velocity during the motion of a liquid in a channel. The
case when in the absence of the field the velocity is distributed according to
the standard law for turbulent flow in a channel was studied. Mercury flowed in
a closed channel. It was put in motion by an electromagnetic pump. Two
rectangular channels of 3 cm width, one 150 cm long and the other 100 cm long.

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L 15719-63
ACCESSION NR: AR3002658

0

served as the working parts of the device. The average depth of the mercury was 4.5 cm. One of the working channels was located in a constant transverse magnetic field with a magnitude of up to 1750 gauss. The other served for comparison. The flow was pressureless. The velocity was varied by the use of a pitot tube, the head of which could be placed along the channel cross section. The average speed of flow was ~15-20 cm/sec. The Reynolds number $R = \rho vR/\eta$ was varied in the experiments from 6680 to 18400 (ρ is the density, R is the hydraulic radius of the channel, η is the dynamic viscosity). The Hartman numbers $M = BR\sqrt{\sigma/\eta}$ varied from 0 to 41.5 (B is the magnetic induction, σ is the conductivity.) Velocity diagrams were made for middle depths (distribution of velocity along the cross section of the channel) for different R's and M's. With increased Hartman numbers the curves became simpler. The ratio of the velocity at the closest measurable point to the wall (a distance of 0.175 cm) to the velocity at the axis varies from 0.7-0.8 for M = 0 up to 0.97 for M = 29. The vertical velocity curves do not depend on M. The hydraulic resistance coefficient is almost independent of the field. The flow in a channel with rough walls was studied. Yu. R.

DATE ACQ: 14Jun63   SUB CODE: PH   ENCL: 00

Card 2/2

L 15721-63   ZTR/EPA(b)/EWT(1)/EPF(n)-2/EWG(k)/EWP(q)/EWT(m)/BDS/EEC(b)-2/
ES(w)-2   AFFTC/ASD/ESD-3/AFWL/IJP(C)/SSD   Ps-4/Pd-4/Pu-4/Pz-4/Pab-4/Pl-4/Po-4
JD/AT/JG

ACCESSION NR: AR3002660   8/0124/63/000/005/B013/B013

SOURCE: Rzh. Mekhanika, Abs. 5B64   101

AUTHOR: Branover, G.G.; Lielausis, O. A.

TITLE: Effect of transverse magnetic field on local hydraulic resistance in a
mercury current

CITED SOURCE: Sb. Vopr. magnitn. gidrodinamiki i dinamiki plazmy. v. 2. Riga,
AN LatvSSR, 1962, 587-590

TOPIC TAGS: mercury, sudden expansion, turbulent flow, resistance, hydraulic
resistance, magnetic field, channel, pulsation, organic glass, Hartman number

TRANSLATION: Experimental results are presented for a study of the sudden ex-
pansion of the turbulent flow of mercury in the presence of an external magnetic
field. The conditions of the experiment are these: 1) A device of the closed
type was used, consisting of a constant current pump, a working chamber and a
Venturi meter; 2) The working chamber is a plane, parallel channel of organic
glass with a sudden widening (h = 4 cm, d_{narrow} = 0.3 cm, d_{wide} = 0.8 cm);

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L 15721-63

ACCESSION NR: AR3002660   O

3) The intensity of the external magnetic field in the working chamber is 4000 gauss, which corresponds to a Hartman number M = 41.4; 4) The mercury flow varies from 6.0-52.3 $cm^3 sec^{-1}$, that is, for the Reynolds number, R the inequality $680 \leqslant R \leqslant 5960$ holds; 5) In the course of the experiment the overfall pressure was measured, the overfall being caused by the local hydraulic resistance, using piezometers located before and behind the sudden widening of the channel. The value of the mercury flow during the course of the experiment was held constant despite the subsequent increase in the magnetic field intensity. From the results of the experiments, expressed in graphic form, it is evident that the coefficient of local resistance,

$$\xi_m = \frac{\Delta p}{\frac{1}{2} p v_2^2}$$

is a function of the expression M^2/R (v_2 is the speed of the mercury current in the broad part of the channel, and M is the Hartman number assigned to the half width of the channel after the widening). As is known, the energy loss in overcoming the magnetic vortex drag which is formed on both sides of the jet is proportional to M^2/R and, in the absence of an external magnetic field, is

Card 2/3

L 15721-63
ACCESSION NR: AR3002660 O

equal to some value $\xi_m = \xi_m{}^o$. Upon the increase of intensity of the field, the value ξ_m decreases and attains a minimum for $M^2/R \approx 0.2$ (the field suppresses turbulent pulsations). For values $0.2 < M^2/R < 0.4$ the retardation effect begins to predominate over the suppression of the turbulence and $\xi_m \sim M^2/R$. For values of $M^2/R > 0.4$ the experimental data are insufficient for an accurate picture of the phenomenon, but one may assume with accuracy up to the dispersion of the experimental data, that ξ_m does not depend on R. Bibl. 3 Citations. P.P. Barashev

DATE ACQ: 14Jun63   SUB CODE: PH   ENCL: 00

Card 3/3

L 15720-63   EPR/EPA(b)/EWT(1)/EPF(n)-2/EWG(k)/EWP(q)/EWT(m)/BDS/T-2/EEC(b)-2/
ES(s)-2/ES(w)-2   AFFTC/ASD/ESD-3/AFWL/TJP(C)/SSD   Ps-4/Pd-4/Pu-4/Pz-4/Pab-4/Pi-4/
ACCESSION NR: AR3002659 Po-4/Pt-4   AT/WW/JD/JG   B/0124/63/000/005/B013/B013

SOURCE: Rzh. Mekhanika, Abs. 5B63

AUTHOR: Branover, G.G.; Lielausis, O. A.

TITLE: Effect of a magnetic field on the processes of turbulent transfer in
a mercury current

CITED SOURCE: Sb. Vopr. magnitn. gidrodinamiki i dinamiki plazmy. v. 2. Riga,
AN LatvSSR, 1962, 591-593

TOPIC TAGS: turbulence, turbulent transfer, transport, resistance, turbulent
flow, mercury, magnetic field, Reynolds number, pulsation, velocity

TRANSLATION: As is known, the dependence of the value of the coefficient of
turbulent resistance during the flow of liquid metal in an external magnetic
field on the field intensity is not a definitive characteristic of turbulent flow.
There is a region of Reynolds number current where the magnetic field does not
influence the coefficient of resistance, despite the fact that the structure of
the flow varies with this. Therefore, it is of interest to study the effect of

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L 15720-63
ACCESSION NR: AR3002659   0

the magnetic field on the process of mass transport in the turbulent current.
The authors studied the effect of the magnetic field on the process of the so-
lution of lead in a mercury current. Rectangular amalgamated samples of lead
(3 X 1.5 X 0.25 cm) were set in a groove in the center of an organic glass slab.
Two slabs were put perpendicular and parallel to the mercury current in the
section where the external magnetic field was located ($\sim$ 1500 gauss); two others
were similarly situated, but in the section where B = 0. In this fashion a rough
simulation of the difference in the processes of solution of lead in a mercury
current in the presence and absence of a field was made. The comparison of the
weight of the samples in the course of certain times (the conditions of the ex-
periment were these: the Reynolds and Hartman numbers were equal respectively to
R$\approx$1950, M$\approx$211) showed that the magnetic field slows the process of solution
of the lead, and this explains the decrease of the turbulent mass transfer, that
is, the decrease in the component of pulsation of velocity in the presence of the
magnetic field. Bibl. 5 citations. P.P. Barashev

DATE ACQ: 14Jun63   SUB CODE: PH   ENCL: 00

Card 2/2

ACCESSION NR: AT4042283   S/0000/63/003/000/0065/0076

AUTHOR: Branover, G.G., Kirko, I.M.(Corresponding member AN LatSSR, Doctor of physico-mathematical sciences); Lyelausis, O.A.(Candidate of physico-mathematical sciences); Tsinober, A. B.

TITLE: Hydraulics of free flows of liquid metal moving in channels with an inversely sloped bottom under the influence of a rotating magnetic field

SOURCE: Soveshchaniye po teoreticheskoy i prikladnoy magnitnoy gidrodinamike. 3d, Riga, 1962. Voprosy* magnitnoy gidrodinamiki (Problems in magnetic hydrodynamics); doklady* soveshchaniya, v. 3. Riga, Izd-vo AN LatSSR, 1963, 65-76

TOPIC TAGS: hydromagnetics, liquid metal free flow, ascending flow channel, rotating magnetic field, flow channel design, flow depth, flow rate, ascending flow equilibrium, streamlined ascending flow, turbulent ascending flow

ABSTRACT: The authors analyze the electromagnetic, gravitational, hydraulic drag and inertial forces acting on a sector of the length of free flow of a liquid metal ascending along the inversely sloped bottom of an open flow channel. After transformations, they evolve an equation for the dynamic equilibrium of such flows

$$\frac{dh}{ds} = \frac{\sin \alpha' - \frac{q^2}{K^2}}{1 - \frac{\alpha q^2}{g h^3}} \qquad (1)$$

Card 1/3

ACCESSION NR: AT4042283

and find that it coincides for small flow depths with known hydraulic equations for
the irregular motion of water in wide rectangular channels with a straight bottom
gradient. A concept of critical flow depth, at which $Fr=1.0$, is illustrated and it
is shown that the flow is streamlined at $h>h_{cr}$ and turbulent at $h<h_{cr}$. Experimen-
tal verification employed an organic glass channel (see Fig. 1 in the Enclosure),
100 cm long and 5 cm wide, and confirmed similarities to turbulent water flows. The
effect of the magnetic field proved insignificant in view of $M^2 \approx 0.3 \cdot 10^{-3}$. It
is concluded that the proper design of flow channels should preclude the occurrence
of flow turbulence by providing for proper flow depth in addition to a proper rate
of flow. Recommended calculation procedures are illustrated. Orig. art. has: 37
equations and 6 figures.

ASSOCIATION: none

SUBMITTED: 04Dec63   ENCL: 01

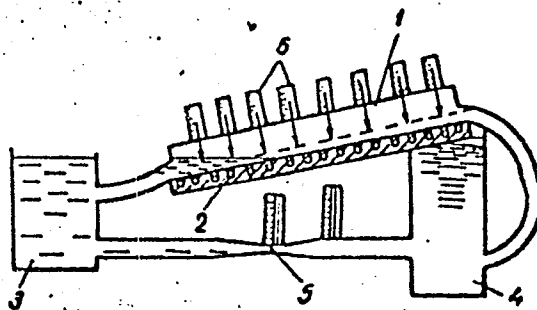SUB CODE: ME   NO REF SOV: 002   OTHER: 000

Card 2/3

Fig. 1. Experimental verification unit: 1 - flow channel; 2 - rotating magnetic
field inductor; 3 - liquid Hg tank; 4 - receiving tank; 5 - Venturi flow meter;
6 - flow depth indicators.

Card 3/3

L 47378-65   EWT(1)/EWP(m)/EPR(sp)-2/EWG(v)/EWA(d)/EPR/EPA(w)-2/T-2/FCS(k)/
EWA(m)-2/EWA(1)   Pd-1/Pe-5/Pab-10/Ps-4/Pi-4   IJP(c)   GS
ACCESSION NR: AT5009762   UR/0000/64/004/000/0133/0135   62
                                                                                  B+/

AUTHOR: Branover, G. G.

TITLE: A simple computational relationship of magnetic hydraulics

SOURCE: Soveshchaniye po teoreticheskoy i prikladnoy magnitnoy gidrodinamike. 3d,
Riga, 1962. Voprosy magnitnoy gidrodinamiki (Problems in magnetic hydrodynamics);
doklady soveshchaniya, v. 4. Riga, Izd-vo AN LatSSR, 1964, 133-135

TOPIC TAGS: magnetic hydraulic theory, magnetic hydraulic resistance coefficient,
critical resistance coefficient, magnetohydrodynamics, turbulent flow

ABSTRACT: Simultaneously with the search for a semiempirical theory of turbulent
magnetohydrodynamic (MHD) flows, one should establish empirical computational
relationships which could be utilized during the design of MHD machines. One
such simple relationship for the calculation of the resistance during turbulent
flow through narrow slits with hydraulically smooth walls may be found by utili-
zing the known fact that for the above-mentioned flow the critical value of the
resistance coefficient corresponding to the turbulent-laminar flow transition is
a constant $\lambda_{m_{cr}} = 0.008$. Using, in addition, the expressions for the Re-number

Card 1/2

L 47378-65
ACCESSION NR: AT5009762

dependence of the resistance coefficient and the Filonenko-Al'tshul formula
(see I. Ye. Idel'chik, Spravochnik po gidravlicheskim soprotivleniyam, Gosener-
goizdat, 1963), the resulting relationship takes the form

$$\lambda_m = \frac{1}{(3,6 \lg Re - 1,11)^2} \left\{ 1 + 250 \left[0,008 (3,6 \lg Re - 1,11)^2 - 1 \right] \frac{M}{Re} \right\}.$$

It is applicable for Re > 575 and $M \leq 0.004$ Re. When compared with experimental re-
sults by J. Hartman and F. Lazarun (Det Kgl. Danske Videnskab. Selskab. (Math.-
fys. Medd.), 1937, 15, 7), W. Murgatroyd (Phil. Mag., 1953, 44, 1348), and
E. C. Broulette and P. S. Lykoudin (Measurements of skin friction for turbulent
MHD channel flow. Lafayette (Ind.) 1962) the results of the above equation turn
out to be on the high side by up to 15%. Orig. art. has: 6 formulas.

ASSOCIATION: None

SUBMITTED: 11Aug64   ENCL: 00   SUB CODE: ME, MA

NO REF SOV: 002   OTHER: 003

Card 2/2

L 57474-65   EWT(1)/EWP(m)/EPA(s)-2/EWT(m)/EWA(d)/EWP(t)/FCS(k)/EWP(b)/EWA(1)   Pd-1/
ACCESSION NR: AP5014173 Pt-7   IJP(c)   UR/0382/65/000/001/0033/0036
                 JD/JG   533.4:532.542.4

AUTHOR: Branover, G. G.; Slyusarev, N. M.; Shcherbinin, E. V.

TITLE: Results of turbulent velocity fluctuation measurements in mercury stream in presence of transverse magnetic field

SOURCE: Magnitnaya gidrodinamika, no. 1, 1965, 33-36

TOPIC TAGS: magnetohydrodynamics, turbulent flow, Reynolds number

ABSTRACT: The purpose of the study was to determine experimentally the predicted suppression of turbulence in mercury flow when a magnetic field is applied across the stream and, to confirm effect of the field on the flow velocity profile. The experiments were performed with Reynolds number ranging from 0 to 3,800 and Hartman's number ranging from 0 to 140. Turbulence and flow profile data were obtained using a specially constructed probe sensitive to dynamic pressures. Turbulence suppression was indicated by decrease in amplitude of velocity fluctuations as the magnetic field increased. Insufficient data precluded determination of dependence of the frequency fluctuations on magnetic field. Orig. art. has: 4 figures.

Card 1/2

L 57474-65

ACCESSION NR: AP5014173

ASSOCIATION: none

SUBMITTED: 12Sep64   ENCL: 00   SUB CODE: ME, EM

NO REF SOV: 005   OTHER: 001

Card 2/2

L 62215-65   EWT(1)/EWP(m)/EPA(s)-2/EWT(m)/EPA(sp)-2/EPF(n)-2/EWG(v)/EWR/EPA(w)-2/
T-2/EWP(t)/EWP(b)/EWA(m)-2   Pd-1/Pe-5/Ps-4/Pt-7/Pl-4/Pu-4   IJP(c)   JD/WW/JG

ACCESSION NR: AP5014104

UR/0382/65/000/001/0115/0122

538.4 : 669.163.1

AUTHOR: Branover, G. G.; Bugrov, N. S.; Kirko, I. M.; Liyelausis, O. A.;
Molochnikov, N. V.

TITLE: Experiments with pressureless channel for molten iron

SOURCE: Magnitnaya gidrodinamika, no. 1, 1965, 115-122

TOPIC TAGS: liquid metal pump, magnetohydrodynamics, electromagnetic field

ABSTRACT: Liquid iron and steel flow in an electromagnetic field was studied.
Special attention was given to flow rates and their dependance on the induction
coil parameters. The test equipment is shown and described in detail. The upward
flow of conducting metal is shown to begin approximately when electromagnetic and
gravitational forces are equal. An empirical expression is given for the value of
the magnetic field necessary for the start of the flow for a case of upward incli-
nation of a degrees (ranging from $0°$ to $10°$). Other experimental results are given
including the energy loss as a function of the current in the inductor coils. Orig.
art. has: 10 formulas, 5 figures.

Card 1/2

L 62215-65

ACCESSION NR: AP5014184

ASSOCIATION: none

SUBMITTED: 24Sep64   ENCL: 00   SUB CODE: MA,EM

NO REF SOV: 005   OTHER: 000

Card 2/2

L 26517-66   EWA(h)/EWT(l)/EWT(m)/ETC(m)-6/T   WW/DJ

ACC NR: AP6011517   SOURCE CODE: UR/0382/66/000/001/0103/0108

AUTHOR: Branover, G. G.; Liyelausis, O. A.; Shekhter, Ye. Yu.

ORG: none

TITLE: Hydraulic principles of determining the parameters of liquid-metal metering devices with constant input pressure

SOURCE: Magnitnaya gidrodinamika, no. 1, 1966, 103-108

TOPIC TAGS: flow meter, liquid metal, flow measurement, liquid metal pump, mhd flow

ABSTRACT: The authors investigate non-stationary hydraulic processes occurring in a liquid-metal meter with electromagnetic induction pump at constant input pressure. The purpose of the investigation is to permit efficient design of such devices. The operation of the meter is divided into five states (filling of the working channel of the pump, raising the metal vertically, motion of the metal horizontally, flow of metal with the pump turned on, flow of metal by inertia after the pump is turned off). The differential equations of flow are written out for each of these stages, and analytic solutions are obtained for the last two stages of the flow. It is shown that by preparing a set of curves representing numerical solutions of these equations it becomes possible to choose the proper diameter of the metal pipe and the operating pressure, as well as to estimate the hydraulic resistance and other losses. Formulas which make it possible to estimate the structural parameters for known pump characteristics are also presented. Orig. art. has: 5 figures and 6 formulas.

SUB CODE: 20/   SUBM DATE: 03Jun65/   ORIG REF: 003

Card 1/1   UDC: 538.4

L 44281-66   EWT(1)/EWT(m)/T   WW/DJ

ACC NR: AP6005393 (N) SOURCE CODE: UR/0413/66/000/001/0142/0142

INVENTOR: Kirko, I. M.; Branover, G. G.; Ioffe, B. A.; Saulite, U. A.

ORG: none

TITLE: Hermetically sealed piston pump. Class 59, No. 177778
[announced by the Institute of Physics, Academy of Sciences, Latvian
SSR (Institut fiziki Akademii nauk Latviyskoy SSR)]

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 1,
1966, 142

TOPIC TAGS: piston, pump, pump, hermetic seal

ABSTRACT: This Author Certificate introduces a hermetically sealed
piston pump containing a inductor, a duct, and pistons. For higher
efficiency the pistons are made of electroconductive nonferromagnetic
material with a ferromagnetic bushing placed inside the piston. For
ease of construction, the pump is made with a braking inductor for
stopping the pistons in the delivery zone (see Fig. 1). Orig. art.
has: 1 figure.

Card 1/2   UDC: 621.65

L 44281-66

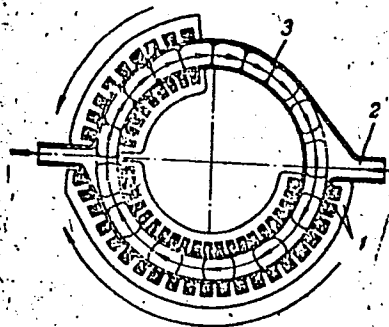ACC NR: AP6005393

Fig. 1   Hermetically sealed
piston pump. 1— Braking
inductor; 2— conduit;
3— piston; 4— bushing

SUB CODE: 13/   SUBM DATE: 20Jul64   [LD]

Card 2/2 mjs

ACC NR: AP7005436

SOURCE CODE: UR/0382/66/000/002/0130/0134

BOGDANOV, Yu. V.; BRANOVER, G. G.; LIYELAUSIS, O. A.; LIYELPETER, YA. YA.; and TANAMAYEV, A. V.

ORG: none

"Hydraulic Properties of Electromagnetic Pump Ducts; I"

Riga, Magnitnaya Gidrodinamika. (Magnetohydrodynamics), No. 2, 1966, pp 130-134

TOPIC TAGS: electromagnetic pump, friction coefficient, hydraulic resistance

Abstract: The flow pattern is studied and the coefficients of hydraulic friction of electromagnetic pump duct models are determined neglecting the effect of the magnetic field. The effect of the shape of the convergent and divergent parts of the electromagnetic pump duct on the coefficient of friction is estimated. The duct model investigated consists of a rectangular section with circular inlet and outlet sections tapering down to the rectangular duct.

Details of the experimental configuration and equipment are given. Results of measurements are presented in a table. Results of the flow pattern study will be presented in a future paper. The studies were carried out at the Hydroelectric and Hydroengineering Laboratory of the Kalinin-Leningrad Polytechnical Institute. Orig. art. has: 5 figures and 1 table. [JPRS: 38,764]

SUB CODE: 20 / SUBM DATE: 13Feb66

Card 1/1

UDC: 532.542.4:538.4

L 11150-67   EWP(m)/EWT(1)/EWT(m)/EWP(w)   IJP(c)   EM/DJ

ACC NR: AP6034575   SOURCE CODE: UR/0382/66/000/003/0003/0021

AUTHOR: Branover, G. G.; Gel'fgat, Yu. M.; Tsinober, A. B.

ORG: none

TITLE: Turbulent magnetohydrodynamic flows in prismatic and cylindrical tubes

SOURCE: Magnitnaya gidrodinamika, no. 3, 1966, 3-21

TOPIC TAGS: turbulent flow, MHD flow, transverse magnetic field, drag coefficient, stress distribution

ABSTRACT: The authors review the present state of experimental and semi-empirical investigations of turbulent MHD flows in prismatic and cylindrical tubes. Experimental investigations of flow in a tube with a slit-like cross section placed lengthwise in the direction of the transverse magnetic field as well as a semi-empirical analysis of two-dimensional flows in the transverse field are discussed. For these two-dimensional flows several variants of the semiempirical theory are proposed for reference functions permitting the calculation of the drag coefficient, the average speed curve and the distribution of stress of the turbulent friction. Orig. art. has: 5 figures and 21 formulas. [Based on authors' abstract]

SUB CODE: 20/SUBM DATE: 22Apr66/ORIG REF: 032/OTH REF: 052/
Card 1/1   UDC: 538.4

Utilization of cobalt and lead for reduction during volumetric determination of molybdenum, vanadium, and tungsten. N. A. Polotebnova and L. M. Titanover. Uchenye Zapiski Kishinev. Univ. 13, 119–31(1954); Referat. Zhur., Khim. 1955, Abstr. No. 55361.—Metallic Co reduces Mo(VI) to Mo(III) in 3.7–1.7N H_2SO_4, and V(V) to V(IV) at 6–5N H_2SO_4. Metallic Pb reduces W(VI) to W(IV) in 10.7N HCl and CO_2 atm. The reduction is accomplished in an ordinary 100-ml. dropping funnel, and the end point is detd. visually: brown-yellow for Mo(V), gray for V(IV), and crimson for W(IV). The use of the mentioned reducers has not been described formerly.   N. Vasilev

BRANOVETS. P

BRANOVETS, P. (Minsk).

Active assistance of Party and Soviet organizations. Pozh. delo
4 no.2:9 F '58.   (MIRA 11:1)
              (Grodno Province—Fire prevention)

BRANOVETS, P. (Minsk)

Forging of specialists. Pozh.delo 8 no.1:27-28 Ja '62.

(MIRA 15:1)

(Fire prevention--Study and teaching)

Surgery

HUNGARY

BRANOVICS, Laszlo, Dr., IHASZ, Mihaly, Dr., and FUSY, Jozsef, Dr.,
Second Surgical Clinic at the University for Medical Sciences (Orvos-
tudomanyi Egyetem, II. Sebeszeti Klinika) in Budapest (Director: MESTER,
Endre, Dr.).

"Liver Echinococcus Cured by Hepatolobectomy"

Budapest, Orvosi Hetilap, Vol 107, No 29, 17 Jun 1966, pp 1363-1364.

Abstract: The hepatolobectomy operation of a 54-year old female patient
suffering from primary liver tumor was described in full detail. Owing
to the echinococcus hepatis an atypical hepatolobectomy was performed
on the left side. The operation resulted in the removal of a cyst lo-
cated in the right lobe of the liver. Pneumothorax in the right
chest cavity and exudation was observed in the postoperative period;
these were successfully treated. The patient recovered fully. 19 re-
ferences, including 10 Hungarian, 2 German, and 7 Western.

1/1

BRANOVITSER, Zigmund (Varshava)

Health of the population of Poland. Sov. zdrav. 20 no.6:81-88 '61.
(MIRA 14:7)
1. Direktor Departamenta meditsinskoy statistiki Ministerstva
zdravookhraneniya i sotsial'nogo obespecheniya Pol'skoy Narodnoy
Respubliki.
(POLAND--PUBLIC HEALTH--STATISTICS)

BRANOVITSKA, S.V.

S/021/62/000/004/009/012
D299/D302

AUTHORS: Bakayev, O.O., Branovyts'ka, S.V., Mikhalevych, V.S.,
            and Shor, N.Z.

TITLE: Determining characteristics of a transportation net-
            work by the method of successive analysis of variants

PERIODICAL: Akademiya nauk UkrRSR. Dopovidi, no. 4, 1962, 469-472

TEXT: A method is proposed for the automatic compilation of tables,
used in the economics of transportation, and their insertion in a
digital computer. Thereby a procedure was developed for analysis of
a transportation network, so as to determine the characteristics
(distance between terminals, transportation costs, etc.). The propo-
sed method results in great economy of time (several hundredfold),
the exclusion of errors, and the possibility of setting up matrices
("checkerboards") of practically unlimited size. In the network,
the following points are determined: The transportation centers, the
distance between neighboring points, the transportation cost per
ton between neighboring points, as well as the production and con-
sumption points and the corresponding volume of product on and con-

Card 1/3

Determining characteristics of a ...   S/021/62/000/004/009/012
D299/D302

sumption. These data are inserted, together with the program of net-
work analysis, into the memory of the digital computer. The algori-
thm ensures obtaining the shortest distances between points (or
cheapest cost). The results are sorted in external memory of the
computer, so that it is possible to proceed directly to solving the
main transportation problem. Mathematically, the problem is formula-
ted as follows: Let an infinite set of points t_1, t_2, ..., t_n be gi-
ven. For certain ordered pair of these points, one determines the
distance between them. An ordered set of points is called chain, if
for each pair of points, belonging to it, the distance has been de-
termined. Now the problem amounts to the determining (among all the
possible chains, connecting 2 given points), the chain to which the
distance is minimal. Such a chain is called optimal. The algorithm
for solving the problem is based on the method of successive analy-
sis of variants, developed at the Computer Center of the AS UkrRSR;
thereby the shortest distances form a given point to all the other
points of the chain are determined simultaneously. The parameters
of optimal chains are stored for further analysis, whereas those of
non-optimal ones are rejected. The algorithm is described by means

Card 2/3

Determining characteristics of a ...   S/021/62/000/004/009/012
D299/D302

of 5 tables. The operation of the algorithm is schematically repre-
sented; thereby it becomes evident that the algorithm is convergent.
It is noted that the computation time for a "checkerboard" of 100 x
100, does not exceed 12 minutes on the "Kiyev" digital computer.
The above algorithm can be used for various transportation problems;
division of work between different types of transportation, distri-
bution of products in regions of consumption (transportation and
production costs being taken into account), location of industries,
etc. There are 1 figure, 1 table and 3 Soviet-bloc references.

ASSOCIATION: Obchyslyuval'nyy tsentr AN URSR (Computer Center of
the AS UkrRSR)

PRESENTED: by Academician V.M. Hlushkov AS UkrRSR

SUBMITTED: August 30, 1961

Card 3/3

BAKAYEV, A.A. [Bakaiev, O.O.]; BRANOVITSKAYA, S.V. [Branovyts'ka, S.V.];
MIKHALEVICH, V.S. [Mikhalevych, V.S.]; SHOR, N.Z.

Determining the characteristics of a transportation system by
the method of successive analysis of variants. Dop. AN URSR
no.4:469-472 '62.

(MIRA 15:5)

1. Vychislitel'nyy tsentr AN USSR. Predstavleno akademikom
AN USSR V.M.Glushkovym [Hlushkov, V.M.].
(Automation) (Electronic digital computers)

BRANOVITSKAYA, V. P., Cand Chem Sci — (diss) "Synthesis of bis-β-chlorethylamine derivatives in the thiazole series." Mos, 1958. 11 pp (Acad Med Sci USSR, Inst of Experimental Pathology and Therapy of Cancer), 120 copies (KL, 17-58, 105)

β - beta

-7-

DIANOVLISKII, M. L.

"Experiment in the Growing of Timber on the Steppes and the Cultivation of Technical Species on the Tikhorets Tree Farm of Krasnodarskiy Kray." Cand Agr Sci, Leningrad Order of Lenin Forestry Engineering Academy imeni S. M. Kirov, Min Higher Education USSR, Leningrad, 1955. (KL, No 16, Apr 55)

SO: Sum. No. 704, 2 Nov 55 - Survey of Scientific and Technical Dissertations Defended at USSR Higher Educational Institutions (16).

BRANOVITSKIY, M.L.

Sections for seed production at experimental and training forest working circles. Nauch. trudy LTA no.99:79-84 '62.
(MIRA 17:1)

BRANOVSKIY, M. A.

"Instruments and Methods of Measuring the Vibration of Steam-Turbine Units." Sub 20 Jun 51, All-Union Order of the Labor Red Banner Heat Engineering Sci Res Inst imeni F. E. Dzerzhinskiy

Dissertations presented for science and engineering degrees in Moscow during 1951.

SO: Sum. No. 480, 9 May 55

BRANOVSKIY, M.A.

Subject	: USSR/Electricity	AID P - 705
Card 1/1	Pub. 29 - 16/18	
Authors	: Kislyy, V. I. and Branovskiy, M. A.	
Title	: Centering of floor-level turbines	
Periodical	: Energetik, 8, 35-36, Ag 1954	

Abstract : In reply to a reader's question, V. I. Kislyy briefly describes a method of centering low-capacity turbines mounted without a pit. M. A. Branovskiy gives a brief reply to a reader's question concerning the use of an improved vibrometer.

Institution : None

Submitted   : No date

BRANOVSKIY, M.A.

Subject   : USSR/Electricity   AID P - 1379

Card 1/2   Pub. 26 - 6/30

Authors   : Abashidze, A. I., and Branovskiy, M. A.,
               Kands of Tech. Sci.

Title   : The performance of turbine foundation frame-
               structures under dynamic load.

Periodical : Elek. Sta., 2, 18-25, F 1955

Abstract   : The authors performed a series of tests with
               eight types of turbine foundations, most of
               which were built between 1947 and 1949 (one was
               built in 1933 and another in 1936). The aim
               of the tests was to study the character of
               vibrations of the foundation as a whole and of
               its separate parts, and, in particular, to

Elek. Sta., 2, 18-25, F 1955

AID P - 1379

Card 2/2   Pub. 26 - 6/30

determine the speed resonance of the system:
turbine and foundation. The author graphically
represents the eight types of frames, presents
diagrams of the shape of vibrations, and gives
a table of numerical data of the results of the
tests. 2 tables, 5 diagrams.

Institution: None

Submitted : No date

BRANOVSKIY, M.A., kandidat tekhnicheskikh nauk; KISLYY, V.I., inzhener.

Correction of vibrations in turbine installations. Elek.sta. 27 no.3:25-31 Mr '56. (MLRA 9:8)
(Turbines--Vibration)

S/104/60/000/010/003/003
E194/E255

AUTHOR: Branovskiy, M. A., Candidate of Technical Sciences

TITLE: Instrument Type БИП-5 (BIP-5) for Studying the
               Vibration of Machines and for Dynamic Balancing of
               Rotors

PERIODICAL: Elektricheskiye stantsii, 1960, No. 10, pp. 47-51

TEXT: The requirements applicable to instruments for
measuring vibration of large turbo-alternators are enumerated and
it is claimed they are met by vibration measuring instrument type
BIP-5. This instrument was developed under the guidance of the
author in the Central Design Office of MSES, with the participation
of Engineer V. I. Petrovich, Engineer V. M. Sablukov and Senior
Technician I. R. Tikhomirov. It is an improved version of
instrument БИП-4 (BIP-4), and series production is now being
undertaken by 'Rostovenergoremont'. The instrument BIP-5 is
intended for study of the vibration of machines and for dynamic
balancing of rotors running in the speed range of 900-12000 r.p.m.
It can measure amplitude of displacement, speed and acceleration of
linear components of oscillatory motion in any direction. It can
also measure frequency of oscillation, phase displacement and wave
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shape. The equipment works as follows. An electro-dynamic vibration pick-up is placed in contact with the vibrating object. The e.m.f. of the pick-up is applied to the measuring unit, which can accept the output of either of two pick-ups. The pick-up e.m.f. is proportional to the rate of vibration, and is thus a measure of displacement or acceleration of oscillatory motion. This e.m.f. is integrated or differentiated by appropriate circuits in the measuring unit. A system of four filters separates the fundamental and harmonics in rotor-balancing operations, and can also separate low-frequency components. A pointer-type instrument is connected to the output of the filters, and a cathode-ray tube displays the wave shape of the oscillation. A built-in calibration and checking device is provided. Phase displacement of the vibration may be measured in one of three ways: (1) by a selsyn circuit consisting of a phase pick-up and phase-meter; (2) by a selsyn circuit in which the stator of the synchronous machine under test is used as phase pick-up or (3) stroboscopically. Fig. 2 shows the circuit

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used in measuring the phase displacement of the vibration: (1) is
a bearing, (2) a machine rotor, (3) the vibration pick-up and (4)
phase pick-up, (5) the cathode-ray tube, (6) the screen, (7) a
scale and (8) a phase-meter. A selsyn built into the measuring
unit serves as a phase-meter. As the machine rotor turns, an
alternating sinusoidal voltage with a frequency corresponding to
the rotor speed is induced in the windings of the phase pick-up.
The phase voltage in each winding of the selsyn is displaced by a
constant angle relative to the phase of rotation of the machine
rotor. Consequently, there is a constant phase displacement
between the rotating rotor and the rotating magnetic field of the
phase-meter stator. Moreover, the e.m.f. of the pick-up is
displaced by a constant angle relative to the phase of the measured
vibration. Change in phase of the bearing vibration relative to
the rotor rotation, which might be caused by a change in the
angular position of rotor out-of-balance, does not alter the phase
of rotation of the rotor. Consequently, the phase-meter rotor must

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be turned in order to bring the pick-up voltage into phase with the
phase-meter, and the angle through which it is turned indicates the
phase displacement of the vibration measured. To use the synchron-
ous machine itself as phase pick-up, the three phases of the stator
are connected to the three terminals of the phase-meter stator.
Measurement of phase displacement takes place as before. The full
selsyn circuit may be used for measuring the phase displacement of
vibration in any machine with a rotating rotor under any conditions.
Synchronous machines can be used as phase pick-ups if they run at
3000 r.p.m. but otherwise their phase displacement of vibration
must be measured stroboscopically. For this purpose a mark on the
rotor is observed by a gas discharge lamp whose moment of ignition
depends on the phase of the vibration pick-up e.m.f. When the
vibration phase alters it alters the phase of the pick-up e.m.f.
and the observed mark on the rotor is displaced by an angle
corresponding to the displacement in the phase of vibration. The
construction of the instrument is described. Its overall dimensions
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are 430 x 175 x 320 mm and it weighs 12 kilograms. The separate
pick-up unit weighs 1 kg, and is an electro-dynamic seismic type
БД·4М (VD-4M) illustrated diagrammatically in Fig. 4. Here 1 is
an annular magnet, 2 the core, 3 a pole piece, 4 the main winding,
5 a damper winding, 6 a counter-induction winding, 7 a spring and
8 a stop to limit travel or to prevent damage in transport. The
frequency and phase characteristics of the instrument in measuring
amplitude of displacement wihout filters are given in Fig. 5. The
x axis is the frequency in cycles per second, the left-hand y axis
is microns displacement and the right-hand y axis angular
displacement. Within the frequency range of 15 to 200 c/s the
range of the instrument is as follows: amplitude of displacement
5-1000 microns; rate of displacement 0.5 to 300 mm/sec; and
acceleration of displacement 0.1-8 g. The error in measurement of
amplitude is ±10% and in measurement of speed and acceleration
±15%. Experience in using the equipment is briefly described. It
was successfully used to investigate the causes of vibration in
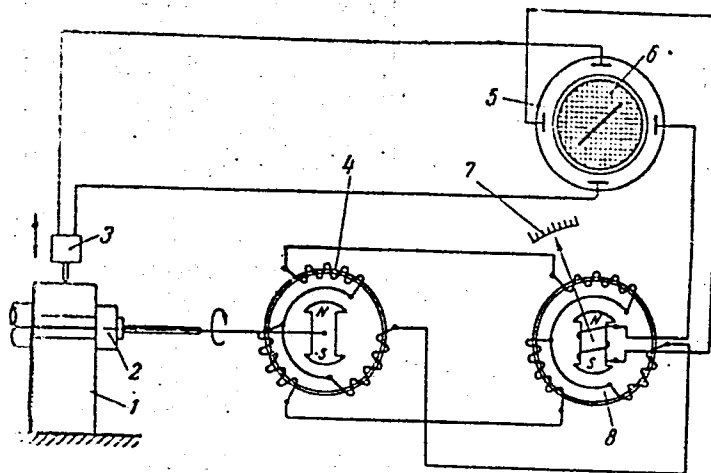
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E194/E255

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four 50 MW, 3000 r.p.m. turbo-alternators. Low-frequency oscillations (19 c/s) of the alternator were found and were shown to be due to instability of the rotor on the bearing oil films. The second critical speed of the rotor was found to coincide with the running speed. The rotors of three alternators were balanced on site; the work was difficult because the running and critical speeds were close together and it was necessary to balance the machine under load. The instrument is robust and can be transported without damage. There are 5 figures and 1 table.

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for Dynamic Balancing of Rotors

Рис. 2. Схема измерения фазы вибрации.
1 — подшипник; *2* — ротор машины; *3* — вибродатчик; *4* — фазовый дат-
чик; *5* — электронно-лучевая трубка; *6* — экран; *7* — шкала;
8 — фазометр.

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E194/E255

Instrument Type BIP-5 for Studying the Vibration of Machines and
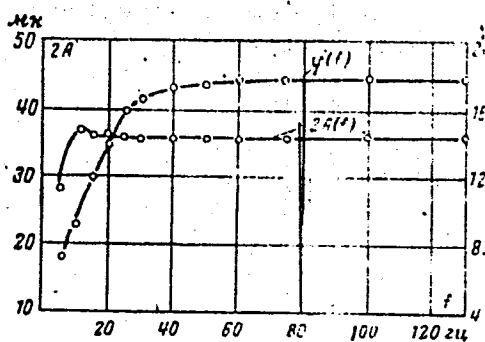for Dynamic Balancing of Rotors

Fig. 5

Рис. 5. Частотная и фазовая характеристики
прибора БИП-5 по смещению без фильтров.

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IORISH, Yu.I.; ANTSYFEROV, M.S., kand. fiz.-mat. nauk, retsenzent;
BRANOVSKIY, M.A., kand. tekhn.nauk, red.; BRATANOVSKIY, V.A.,
red.; BYKHOVSKIY, I.I., inzh., red.; VASIL'YEVA, R.V., inzh.,
red.; KORITYSSKIY, Ya.I., kand. tekhn. nauk, red.; KUSHUL',
M.Ya., doktor tekhn. nauk, red.; PEVZNER, L.A., inzh., red.;
SHMELEV, V.A., kand. tekhn. nauk, red.; BYSTRITSKAYA, V.V.,
red.izd-va; UVAROVA, A.F., tekhn. red.

[Vibrometry; measurement of vibrations and shocks, general
theory, methods and devices] Vibriometriia; izmerenie vibra-
tsii i udarov. Obshchaia teoriia, metody i pribory. Izd.2.,
perer. i dop. Moskva, Mashgiz, 1963. 771 p. (MIRA 17:2)

BRANOVSKIY, M.A., kand. tekhn. nauk; SIVKOV, A.P., inzh.

Elimination of the thermal unbalance of rotors with forced cooling of the windings. Elek.sta. 35 no.9:38-43 S '64.

(MIRA 18:1)

BRANOWITSER, Zigmunt [Branowicer, Z.] (Varshava)

Public health in the Polish People's Republic in the light of
medical statistics. Sov.zdrav. 19 no.10:18-22 '60.

(MIRA 14:1)

1. Direktor departments meditsinskoy statistiki Ministerstva zdra-
vookhraneniye i sotsial'nogo obespecheniya Pol'skoy Narodnoy
Respubliki.

(POLAND—PUBLIC HEALTH—STATISTICS)

BRANSBURG, P-S

CA

PROCESSES AND PROPERTIES INDEX

1 8

Improvement of working conditions in the production of hydrochloric acid and sodium sulfate. P.-B. Bransburg and T. S. Karucharov (Moscow Sanit. Hygiene Inst.). *Gigiena i Sanit.* 11, No. 7/8, 28 36(1946).—The sources of contamination and leakages are analyzed and recommendations given for better control of the ventilating systems.   Boris Gutoff

A.S.M.–S.L.A.   METALLURGICAL LITERATURE CLASSIFICATION

BRANSBURG, O.

Only two years have passed... Prom.koop. 14 no.1:32 Ja '60.

(MIRA 13:5)

1. Tekhnoruk arteli "Progress," Vitebsk.
(Vitebsk--Physically handicapped--Rehabilitation)

Effect of stirring electrolyte on the electrolytic deposition of powdered copper. A. V. Pomosov and V. A. Branshtein. Zhur. Priklad. Khim. 30, 1255-8(1957).—The effect of stirring on the structure of electrodeposited powd. Cu was studied at 50 ± 1° with a cylindrical Cu anode and a Cu-rod (11 mm. diam.) anode in an electrolyte contg. $CuSO_4 \cdot 5H_2O$ 80 and H_2SO_4 120 g./l., with a c.d. of 16 amp./sq. dm. The fraction of large particles, from 160 to 450 μ, increased with rate of stirring ω from 9.7% at 300 r.p.m. to 43% at 2200 r.p.m., whereas the proportion of fine particles, $<80 \mu$, decreased from 40.5 to 14.8%; the d. increased with ω. The ratio of dendrites to the total no. of visible particles decreased rapidly as ω increased to 1600 r.p.m. and approached constancy. At $\omega = 1500$ r.p.m. this ratio increased with the concn. of Cl^- added as HCl. The current efficiency increased with ω, passing through a max. of 93.8–94% at $\omega = 1000$–1500 r.p.m., and then decreased to 75% as ω increased to 2200 r.p.m. But in a more dil. soln. ($CuSO_4 \cdot 5H_2O$ 40, H_2SO_4 120) g./l.) the current efficiency increased with ω continuously. I. Bencowitz

BRANSHTEYN, V.V., inzh.

Trials of the tanker Belgrad. Sudostroenie 30 no.11:69
N '64.

(MIRA 18:3)

BRANSKA, K.; KWIATKOWSKI, A.; PUCHALSKA, I.B.

Use of the electron microscope in studies on ferromagnetic
powders. Archiw elektrotech 13 no.3:697-711 '64.

1. Department of General Physics B, of the Technical University,
Warsaw.

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15 2650

25143
P/045/61/020/005/006/008
B133/B212

AUTHORS: Leibler, Karoline and Brański, Wojciech

TITLE: Two-phase ferroelectric systems (I. barium titanate-metal)

PERIODICAL: Acta Physica Polonica, v. 20, nos. 5-6, 1961, 447-453

TEXT: In a previous paper (Leibler, J. Chim. phys., 70, 677 (1959)), one of the authors has investigated how far the addition of metals will change the dielectric constant of various dielectric plastics, such as paraffin and polystyrene. A considerable increase of the dielectric constant ε is obtained according to the increase in the concentration of the metal, whose dielectric constant can be taken as infinite. In the present paper, the influence of the addition of powdered silver, nickel, or iron on ferroelectric barium titanate is discussed. The metal powder with its grains irregular in shape was passed through a 0.1-mm sieve. Since it was necessary to bake the barium-titanate ceramics at the high temperature of 1,350°C, it was very difficult to prevent the oxidation of the metal while preparing the specimens. Thus, the specimens were first compressed under a pressure of 3,500 atm and then baked twice in a vacuum furnace at a pres-

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                                                   B133/B212

sure of 10^{-3} to 10^{-4} mm Hg. The disadvantage of this method was that the furnace had to be cooled very rapidly. The dielectric constants of the specimens obtained were no optimum values. They amounted to 1,000 for pure barium titanate. The dielectric constant and the dielectric phase angle were measured at 1 Mc/sec and at 200 kc/sec by applying the bridge method. A plate capacitor placed into a thermostat was utilized for the measurements. X-ray analysis confirmed the good intermixture of the specimens. The volume concentration of the metal was determined by measuring the mass and density with an error of about 6%. The error of measurement was 1% for ε, 5% for the dielectric phase angle, and 0.2°C for the temperature measurement. As shown in Fig. 1, the dielectric constant will increase rapidly according to the increase of the metal concentration at a constant temperature. At a certain value of the concentration, the mixture becomes a conductor. Investigations of the dielectric constant as a function of temperature showed no change of the Curie point by the metals added. The Curie-Weiss point and the Curie-Weiss constant are shifted, however, as can be seen from Fig. 3. The best theoretical approximation is achieved with Odolewski's (Odolewski, Zh. tekh. Fiz., 21, 667, (1951)) formula

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Two-phase ferroelectric systems...

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B133/B212

$$\varepsilon_m = \frac{\varepsilon_2}{1-k\vartheta}, \text{ where } k = \frac{1}{\vartheta_{cr}} \qquad (1),$$

where ε_m denotes the dielectric constant of the mixture, ε_2 that of the medium, ϑ_{cr} the concentration at which the mixture becomes a conductor. Further research is carried out with the aim to improve the technology of the two-phase ferroelectrics, to find out how this technology affects the constants of the system, and also to investigate the aging process of these mixtures. There are 3 figures and 7 references: 1 Soviet-bloc and 6 non-Soviet-bloc. The three references to English-language publications read as follows: Lewin, J. Instn Elect. Engrs, 94, 55 (1947); Leibler, J. Chim. phys., 70, 677, (1959); De Vries, Brit. J. appl. Phys., 8, (1957);

ASSOCIATION: Polytechnic School, Chair B of General Physics, Warsaw

SUBMITTED: January 2, 1961
Card 3/7

LIEBLER, Karolina; BRANSKI, Wojciech

Two-phase ferroelectric systems. Pt.2. Acta physica Pol 23 no.3:
279-285 Mr '63.

1. Polytechnic High School, Chair B of General Physics, Warsaw.

BRANSKIY, V.P.

Philosophical significance of the "problem of visualization"
in modern physics. Vest. LGU 12 no.5:82-91 '57.   (MLRA 10:6)
(Physics--Philosophy)

BRANSKIY, Vladimir Pavlovich; LAMAGINA, G.K., red.; VODOLAGINA, S.D.,
tekhn. red.

[Philosophic significance of the "obviousness problem" in
modern physics] Filosofskoe znachenie "problemy nagliadnosti" v
sovremennoi fizike. Leningrad, Izd-vo Leningr. univ., 1962. 192 p.
                                                    (MIRA 15:6)
(Physics—Philosophy)

SVIDERSKIY, V.I., doktor fil. nauk; SHTOFF, V.A., kand. fil. nauk;
    IZMAYLOV, S.V., kand. fiz.-mat. nauk; BRANSKIY, V.P., kand.
    fil. nauk; MOSTEPANENKO, M.V., kand. fil. nauk; MELYUKHIN,
    S.T., kand. fil. nauk; MIKHLIN, Ye.I., red.; YELIZAROVA,
    N.A., tekhn. red.

[Philosophical problems in the present-day theory of motion
in nature]Filosofskie voprosy sovremennogo ucheniia o dvi-
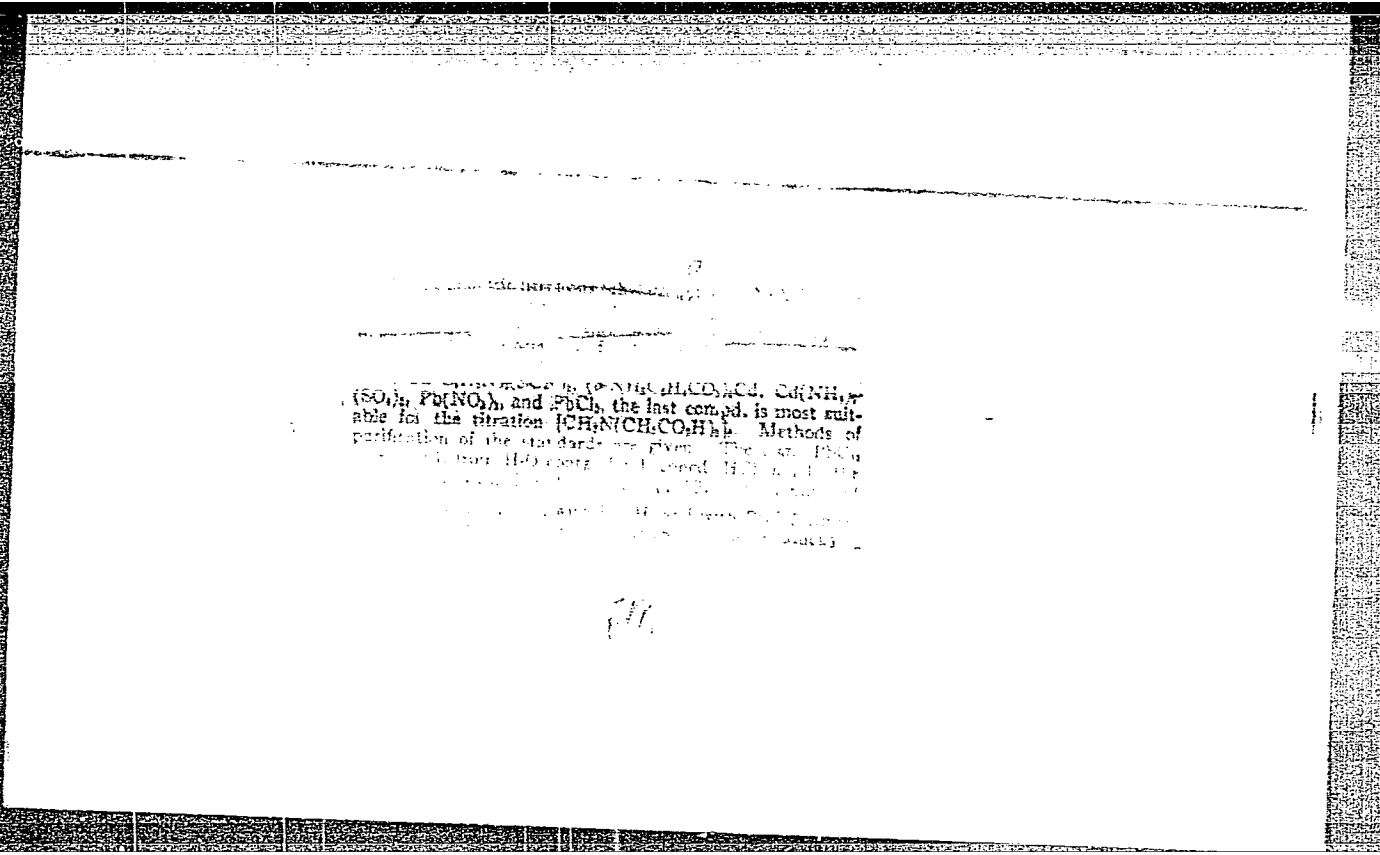zhenii v prirode. Leningrad, 1962. 198 p.   (MIRA 15:10)

1. Leningrad. Universitet.
    (Science--Philosophy)   (Motion)

BRATSKY, E.

"New syntheses in the chemistry of acetylene."
Chemicke Zvesti, Bratislava, Vol 6, No 9/10, Nov./Dec. 1952, p. 561

SO: Eastern European Accessions List, Vol 3, No 10, Oct 1954, Lib. of Congress

BRATSKY, E.

$(SO_4)_3$, $Pb(NO_3)_2$ and $PbCl_2$, the last comp'd. is most suit-
able for the titration $[CH_3N(CH_2CO_2H)_2]$. Methods of
purification of the standards are given.

BRANSTETR, J.

"Determination of hydrazine hydrate through volumetric analysis." Chemicke Zvesti, Bratsilava, Vol. 8, No. 5, May 1954, p. 261.

SO: Eastern European Accessions List, Vol. 3, No. 11, Nov. 1954, L.C.

BRANDSTETR, J.

SURNAME, Given Names

Country: Czechoslovakia

Academic Degrees: [not given]

Affiliation:

Source: Prague, Collection of Czechoslovak Chemical Communications,
                    Vol 26, No 10, October 1961, pp 2596-2601
Data:
                    "Radiometric Determination of the Solubility Product
                    of Ruthenium Tetrahydroxide."

   Authors:
   BRANDSTETR, J, Institute of Chemistry (Institut fuer Chemie), Brno
   KRIVANEK, M, Technical College (Technische Hochschule), Brno
   VRESTAL, J, A Zapotocky Military Academy (Militaerakademie "A Zapotocky"),
        Brno

BRANDSTETR, J.; VRESTAL, J.

Methods of gravimetric determination of ruthenium based on hydrolysis.
Coll Cz Chem 27 no.8:1798-1810 Ag '62.

1. Chemisches Institut, Technische Hochschule, Brno und Militarakademie
A. Zapotocky, Brno.

DRANI, A. A.

Dissertation: "A Method for Measuring Dielectric Penetrability of Liquid and Solid Dielectric Materials in the Range of Decimeter Waves." Cand Phys-Math Sci, Moscow State U, Moscow, 1953. Referativnyy Zhurnal--Khimiya, Moscow, No. 7, Apr 54.

SO: SUM 284, 26 Nov 1954

DRANI, A. A.

KUSHELEV, Viktor Viktorovich; SOKOLOV, Igor' Aleksandrovich; BRANT, A.A., nauchnyy red.; KUSKOVA, A.I., red.; TSAL, R.K., tekhn.red.

[Plastic hulls] Korpusa sudov iz plastmass. Leningrad, Gos. soiuznoe izd-vo sudostroit.promyshl., 1960. 111 p.

(MIRA 14:2)

(Hulls (Naval architecture))   (Plastics)

ACC NR: AP6032538   SOURCE CODE: UR/0413/66/000/017/0149/0149

INVENTOR: Brant, A. A. Kostyuchenko, K. A.; Lebedev, G. P.; Zharov, V. M.

ORG: none

TITLE: A method of fastening fillers to plastic paneling of two- and three-layered marine gear and equipment structures. Class 65, No. 185716

SOURCE: Izobreteniya, promyshlennyye obraztsy, tovarnyye znaki, no. 17, 1966, 149

TOPIC TAGS: ᵛfastener, structure panel, marine engineering, filler, plastic product

ABSTRACT: This Author Certificate introduces a method of fastening fillers to plastic paneling of two- and three-layered marine gear and equipment structures by means of plastic plugs inserted between the panels. For greater holding power and more esthetical appearance of the assembly, the seats for the fasteners are formed by making cylindrical channels between the panel layers with diameters larger than the opening in the panel. An adjuster crew is inserted into the channel and the space around it is filled with a solidifier which forms a threaded sleeve for the fastener when the adjuster screw is screwed out. Orig. art. has: 1 figure.

SUB CODE: 13/// SUBM DATE: 21Jun65/

Card 1/1
                              UDC: 629.12.011.28. 002.29:629.12.01

1. BRANT, A. L.

2. USSR (600)

4. Larynx

7. Laryngospasm in cauterization of laryngeal ulcers. Vest.oto-rin 14 no. 6 1952

Monthly Lists of Russian Accessions, Library of Congress, March, 1953, Unclassfied.

BRANT, A.L.

Intravenous administration of novocain in control of cough in pulmonary tuberculosis. Klin. med., Moskva 30 no. 11:30-31 Nov. 1952.

(CLML 23:5)

1. Of Dolossy Clinical Tuberculosis Sanatorium, Yalta.

BRANT, A.L.,kandidat meditsinskikh nauk(Yalta)

Some data on the action of novocaine block in tuberculosis of the lungs and throat. Klin. med. 33 no.9:91-92 S '55.   (MLRA 9:2)

1. Iz klinicheskogo tuberkuleznogo sanatoriya "Dolossy" (i.o. glavnogo vracha S.V. Belyayev)
          (NOVOCAINE) (LARYNX-TUBERCULOSIS)

BRANT, A.L., kandidat meditsinskikh nauk; LEVIN, M.G.

The role of bronchoscopy in disorders of bronchial permeability between the various stages of a thoracoplastic operation. Probl. tub.34 no.6 supplement:27 N-D '56.

(MLRA 10:2)

1. Iz Klinicheskogo tuberkuleznogo sanatoriya Vsesoyuznogo Tsen-tral'nogo Soveta professional'nykh soyuzov no.1 "Dolossy."

(BRONCHOSCOPY)   (LUNGS--SURGERY)

BRANT, A.L., kandiat meditsinskikh nauk (Khar'kov)

Endoscopic picture of the tracheobronchial tree in patients with open forms of pulmonary tuberculosis. Vrach.delo no.6:591-595 Je '57.

(MLRA 10:8)

1. Tretiy ukrainskiy tuberkuleznyy sanatoriy
    (TUBERCULOSIS)   (BRONCHOSCOPY)