S/281/63/000/001/004/004
E194/E155

A fundamental theory of the ...

discharge from the pump to the total drive power. Separate expressions are derived for such components of the equation as the hydraulic efficiency, the frictional head and others, so that the resulting equation for pump performance is complicated though usable. Analysis of the expressions derived shows that there is an optimum value of fluid friction against the disk which gives maximum pump efficiency. In practice, the best results are obtained if the disk sections fill 0.4-0.5 of the inlet section. The influence of pump design and geometry on performance is then considered and performance curves are constructed for pumps of given designs. A special rig was built in which the spacing between disks could be in the range 5 - 9 mm, the coefficient of friction 0.032 - 0.77, the speed 1000 - 7000 rpm, the discharge diameter 100 - 500 mm, and the height of roughnesses on the disk surface (which influences the Reynolds number in the gap) 0.005 - 0.85 mm. There is good agreement between experimental characteristics obtained on this rig and calculated values, provided that the specific speed is greater than 70 - 80. If it is less, the experimental values of efficiency and head are lower than calculated. There are 12 figures.

Card 2/2 SUBMITTED: July 6, 1961

PHASE I BOOK EXPLOITATION SOV/6204

Perel'man, Roman Grigor'yevich

Dvigateli galakticheskikh korabley (Engines for Intergalactic Ships) Moscow, Izd-vo AN SSSR, 1962. 197 p. (Series: Akademiya nauk SSSR. Nauchno-populyarnaya seriya) Errata slip inserted. 25,000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR.

Resp. Ed.: K. P. Stanyukovich; Ed. of Publishing House: N. B. Prokof'yeva; Tech. Ed.: S. P. Golub'.

PURPOSE: This book is a popular treatment intended to acquaint nonspecialist readers with various engine design concepts for use in intergalactic ships.

COVERAGE: The book gives information on interstellar "routes", discusses the principal limitations of rockets with engines using chemical and nuclear fuels, and presents the basic concepts necessary to an understanding of

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PHASE I BOOK EXPLOITATION SOV/5703

Perel'man, Roman Grigor'yevich, Candidate of Technical Sciences

Shturm kosmosa prodolzhayetsya (The Assault on Space Continues) Moscow, Izd-vo "Znaniye," 1961. 44 p. (Series: Vsesoyuznoye obshchestvo po rasprostraneniyu politicheskikh i nauchnykh znaniy. Seriya IX, 1961: Fizika i khimiya, no. 13) 26,000 copies printed.

Ed.: I. B. Faynboym; Tech. Ed.: A. S. Nazarova.

PURPOSE: This booklet is intended for the general reader.

COVERAGE: The booklet reviews the development of Soviet exploration of outer space and describes aspects of recent Soviet achievements. Propulsive efficiencies, velocity requirements, rockets, guided rocket vehicles, satellites, the satellite capsule, launching, control, power systems, and atmospheric entry are discussed. References to future possibilities and trends are made throughout the booklet. A few illustrations are included. No personalities are mentioned. There are 26 references, all Soviet.

Card 1/2

PEREL'MAN, Roman Grigor'yevich; STANYUKOVICH, K.P., prof., otv. red.; PROKOF'YEVA, N.B., red. izd-va; GOLUB', S.P., tekhn. red.

[Engines of galactic ships]Dvigateli galakticheskikh korablei. Moskva, Izd-vo Akad. nauk SSSR, 1962. 197 p. (MIRA 15:9)
(Spaceships—Propulsion systems)

PEREL'MAN, Roman Grigor'yevich, kand. tekhn. nauk; FAYNBOYM, I.B., red.; NAZAROVA, A.S., tekhn. red.

[Assault on outer space continues] Shturm kosmosa prodolzhaetsia. Moskva, Izd-vo "Znanie," 1961. 44 p. (Vsesoiuznoe obshchestvo po rasprostraneniiu politicheskikh i nauchnykh znanii. Ser.9, Fizika i khimiia, no.13) (MIRA 14:8)

(Space flight)

PHASE I BOOK EXPLOITATION SOV/5686

Perel'man, Roman Grigor'yevich

Zvezdnyye korabli (Stellar Ships) Moscow, Izd-vo "Sovetskaya Rossiya," 1961. 61 p. 20,000 copies printed.

Scientific Ed.: G. I. Babat, Doctor of Technical Sciences, Professor; Ed.: N. Ts. Stepanyan; Ed.: E. Rozen.

PURPOSE: This is a popular booklet for general readers.

COVERAGE: The booklet deals with problems in the development of astronautics. Prognosis for the future and the scientific basis for building spaceships are given on the assumption that the development of astronautics will follow the lines being laid down by science at the present time. Soviet and non-Soviet open sources were used. No personalities are mentioned. There are no references.

Card 1/3

PEREL'MAN, R., STANYUKOVICH, K.

Let's be optimistic! Znan.sila 35 no.7:38-40 Jl '60. (MIRA 13:7)

(Space flight)

Perel'man, R.G.

S/024/60/000/04/003/013
E/194/E484 82207

10.4000

AUTHOR: Perel'man, R.G. (Moscow)

TITLE: The Selection of Optimum Parameters for an Injector-Pump Runner System

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Energetika i avtomatika, 1960, No.4, pp.59-73

TEXT: The method developed by TsAGI (Central Aerodynamic and Hydrodynamic Institute) for the design of fans can be adapted to determine the optimum inlet diameter of a pump runner to achieve minimum inlet pressure loss. This makes approximate allowance for rotary motion that is set up in fluid that has not yet reached the runner. The anti-cavitation properties of the equipment may be further improved by means of an ejector, such as that illustrated schematically in Fig.1, in which part of the head available before the nozzles is used to set up axial flow and for ejection, and another part to set up rotary motion of the fluid before entering the runner. The fluid for the ejector is taken from the high-pressure part of the system. The object of the present article is to determine the optimum distribution of the head available before the nozzle of the ejector to set up axial

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E194/E484 82207

The Selection of Optimum Parameters for an Injector-Pump Runner System

and peripheral velocity in the ejector-pump system. The angle of the nozzle in the horizontal plane β_2 in Fig.1 is first considered. Tests have shown that for small values of β_2 the flow rotates mainly near the chamber walls, but when $\beta_2 = 45°$ the rotary motion is reasonably well distributed. On the other hand, increase of β_2 above $45°$ reduces the rotary rate of flow. Experimentally determined values of the two velocity components for different values of β_2 are plotted in Fig.2, and Fig.3 shows velocity diagrams across the radius for three different values of β_2. It is seen that a value of β_2 close to $45°$ is the most favourable. The generally accepted equation for determination of the head required at inlet to the set (in the absence of an ejector) drawn up for flow conditions on the outer diameter of the blades, where cavitation is most likely, is given in Eq.(2). The ejector-pump system is then analysed further to derive the necessary changes in Eq.(2), and the optimum inlet diameter in the presence of a shaft is given by Eq.(4), or in the absence of a shaft by Eq.(4'). The use of an ejector which sets up an additional head and rotates the

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flow causes changes in the expression for determining the total inlet head, see Eq.(2'). Further consideration is then given to detailed consideration of terms entering into Eq.(2). The reduction in required pressure that results from reduction in the relative velocity at the inlet diameter is assessed. The change in angle of attack resulting from the rotation of the flow before the wheel is discussed in relation with the vector diagram of Fig.4. Expression (12) is derived for the increase in the available static head caused by the ejectors. The equation for the optimum head distribution is then derived in the form of Eq.(15) which may be used to derive various of the necessary velocities. Analytical solution of Eq.(15) involves the use of a small difference between two large terms and great care is required to obtain sufficient accuracy and accordingly a semi-graphical method is recommended. The semi-graphical method gives graphs in dimensionless coordinates for the common practical case of an overhung wheel. The construction and use of the graph is illustrated by an example of selection of the angle of slope of

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The Selection of Optimum Parameters for an Injector-Pump Runner System

the ejector nozzles. The nature of the changes of the various magnitudes (see Eq.(13)) with constant drop in the nozzle and various angles of slope of nozzle are plotted in Fig.5 and curves of the relative gain in inlet pressure are plotted in Fig.6. Finally, Fig.7 shows a combined resultant graph of the relative gain in inlet pressure, which may be used directly to determine the best ejector nozzle angle. The use of this graph is explained and numerical examples are worked, see Fig.8, curve 2. It is shown from Fig.7 that in one particular case the improvement in anti-cavitation properties of the pump which can be achieved by using a combined ejector is about 1.2 times greater than that when all the pressure drop on the nozzle of the ejector is used to set up swirl. At present, axial ejector-pumps are commonly used and accordingly an example is given. The combined resultant gain curves for this case are given in Fig.9. Experimental work was done using an incompressible liquid to check the above recommendations on the selection of optimum nozzle angles for the ejector in the ejector pump system. The necessary

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The Selection of Optimum Parameters for an Injector-Pump Runner System

pump design data are given. The procedure used to determine the cavitation characteristics is explained. A cross-sectional diagram of the pump and ejector are shown in Fig.11. Results are plotted in Fig.10 and it will be seen that, for reasons which are explained, the increase in static pressure developed by the ejector was about 5% lower than the calculated figure. There was a corresponding diminution in the possible gain. Finally, the combined ejector illustrated in Fig.11b was tested. In this case, the possible reduction in the dynamic component of the pressure required at inlet was 5 to 6% below the calculated value, for reasons which are explained. In selecting the optimum pump inlet diameter, and so in constructing the graphs of Fig.7 and 9, no allowance was made for possible further increase in optimum diameter caused by swirl of the liquid before inlet to the runner. This simplifies the problem but to be sure that the assumptions do not greatly impair the advantages of using an ejector, an assessment is made of the change in optimum diameter that results from allowing for swirl of the liquid. The results

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PERELMAN, R G

10(2)(4); 14(6)(10) PHASE I BOOK EXPLOITATION SOV/3427

Polikovskiy, Vladimir Isaakovich and Roman Grigor'yevich Perel'man

Voronkoobrazovaniye v zhidkosti s otkrytoy poverkhnost'yu (Formation of Funnel-Shaped Depressions in Liquid with a Free Surface) Moscow, Gosenergoizdat, 1959. 190 p. 1,750 copies printed.

Ed.: P.G. Kiselev; Tech. Ed.: G.Ye. Larionov.

PURPOSE: This book is intended for specialists and students of hydrotechnics, as well as for engineers designing various kinds of industrial and transportation hydraulic system.

COVERAGE: This book presents the results of theoretical and experimental studies devoted to the problem of vortex formation in the flow of a liquid with a free surface. The book is divided into two main parts. The first part discusses the physical nature of vortices and the method of evaluating phenomena which arise when a liquid has a vortex. Among the topics considered are: theory of vortex formation, experimental study of physical

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existence of vortex formation, and calculation and construction of vortex profiles. Part two discusses vortex formation in the upper water of hydrotechnical installations. Among the topics considered are: vortex formation in front of locks of hydrotechnical installations, determination of lock stresses in draining off solid floating objects by means of vortices, evaluation of permeability capacity of hydroturbine spiral chambers, prevention of vortex formation, and the use of vortices in cleaning foreign objects from the surface of reservoir waters. There are 130 references: 113 Soviet, 6 German, 5 English, 3 French, 1 Hungarian, 1 Italian, and 1 Rumanian.

TABLE OF CONTENTS:

AVAILABLE: Library of Congress

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AC/jb
4-8-60

SOV/25-59-6-27/49

AUTHOR: Perel'man, R.G., Candidate of Technical Sciences

TITLE: The Attack on the Thermal Barrier

PERIODICAL: Nauka i zhizn', 1959, Nr 6, pp 59-64 and p 3 of centerfold (USSR)

ABSTRACT: This is a popular introduction into the problems connected with the attempt to overcome the so called thermal barrier, i.e. the sharp increase in heating up of the aircraft during flight, and the increasing difficulties connected with building high speed aircraft. The author deals first with the sound barrier and how it was overcome, and then describes an imagined flight of 4,500 km/h at a height of 11 km. He sets forth the difficulties arising because of the intensive heating up of the aircraft, stating that a further rise in speed will require the increased use of heat-resistent steels. It will also be necessary to develop new methods and instruments for the processing of materials in order to ensure the high productivity of the aircraft industry with such steels. It is evident that the materials selected for

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The Attack on the Thermal Barrier

the building of aircraft should be as little as possible subjected to dimensional changes due to temperature. The author refers to the US experimental aircraft "X-15" designed for training flights at super-sonic speeds. However, the selection of suitable construction materials does not solve the entire problem since the aircraft also holds tanks with fuel, numerous devices and a human being. The difficulties experienced in this connection are also set forth. The author deals with the possibilities of "keeping off" the heat by making a "sweating" skin of porous, non-rusting steel. The author also mentions other known methods leading to a protection of the skin against high temperatures, such as a skin of materials which only poorly conduct heat, are fireproof, or let the hot air rotate the turbine wheel of a special refrigerator. Examining the prospects for the future, the author points to the possibility of maneuvering, i.e. to fly at a maximum speed until the aircraft skin is heated up to about 400° C, then reduce the speed radically to let the aircraft cool off and thereafter increase the speed again. He hints at increas-

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The Attack on the Thermal Barrier

ing the aircraft's altitude as another way of meeting the difficulty. It will permit the aeroplane to fly at a speed of about 10,000 km/h at heights of 100 to 150 km for several hours without overheating. Concluding, he states that through the endeavors of engineers, designers, physicists and chemists aircraft will from year to year be able to fly faster, farther and higher. There are 11 sets of drawings and 1 graph.

Card 3/3

PEREL'MAN, R.G., kand.tekhn.nauk

Nuclear transport. Politekh.obuch. no.6:66-79 Je '57.
(MIRA 12:4)

(Nuclear engineering)

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001240010013-9"

KOVALEVSKAYA, A.Ye. PEREL'MAN, R.G. (Moskva).

Heat exchange in the field of action of centrifugal forces. Izv. AN SSSR. Otd. tekh. nauk. no.11:92-94 N '58.

(MIRA 12:1)

(Heat--Transmission) (Centrifugal force)

SOV/124-57-9-10349

Translation from: Referativnyy zhurnal, Mekhanika, 1957, Nr 9, p 66 (USSR)

AUTHORS: Polikovskiy, V. I., Perel'man, R. G.

TITLE: The Evaluation of Loads on Water Gates Due to Floating Solid Bodies Sucked Into Whirlpools (Otsenka nagruzok na zatvory pri podsasyvanii voronkami tverdykh plavayushchikh tel)

PERIODICAL: Tr. MAI, 1955, Nr 50, pp 216-230

ABSTRACT: The paper submits the results of investigations on the evaluation of possible additional loads on water gates due to solid floating bodies (logs) sucked under by whirlpools. The investigations were conducted in the hydraulic flume on a model of the spillway dam of the Kuybyshev Hydraulic Power Plant built to a scale of 1:50. Whirlpools were created in the corners between the gate and the pier by means of a tangential delivery of water through an eddy stimulator. The basic laboratory tests were made with two values of the opening of the gate $a/H=0.25 \div 0.30$ and 0.5. The Reynolds number was expressed as $R = rC_u/\gamma$, where C_u was the peripheral velocity at a radius r. Round wooden logs were used as models of the floating bodies. A high-speed motion-picture film was made at 80 frames per second. The

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The Evaluation of Loads on Water Gates Due to Floating Solid Bodies (cont.)

tests were analyzed by the consecutive projection onto a screen of the single motion-picture frames and the positioning of the moving body upon a coordinate grid every 1/80 of a second. Floats entering in the hollow of a vortex and observed by means of a stroboscope, as well as on the coordinate grid, made possible an evaluation of the intensity of the whirlpool. The authors also conducted full-scale observations on the suction of floating objects into the whirlpool under the water gates of the Ivan'kovskaya dam. On the basis of the investigations made, as well as of investigations made by other authors, two typical cases of the motion of a log before a gate were established: A) When the whirlpool does not have the intensity required for sucking a body under the gate, and B) when the whirlpool sucks the body under and carries it out under the gate. In the first case (direct impact of the log against the gate), assuming that the impact is absolutely inelastic, the impulse of the force is determined as equal to $N = 0.8mv$ with $\alpha = 45^{\circ}$ and $N = mv$ with $\alpha = 0^{\circ}$ and 90°, where α is the angle between the direction of the log and the normal to the gate. Since the greatest specific impact loads occur with $\alpha = 0^{\circ}$ (head-on longitudinal impact by the log), this impact condition is the most dangerous. In this load condition the mean value of the force during the time of the impact is

$$P = \frac{N}{\tau} = \frac{mv}{2l\sqrt{3\gamma_T/E_g}}$$

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The Evaluation of Loads on Water Gates Due to Floating Solid Bodies (cont.)

In the second case, if the log, because of its large size and an insufficient intensity of the whirlpool, is not carried away by the latter at once, but rotates vertically, goes down along the gate, and accomplishes a turn around the bottom edge of the gate, then the force acting upon that edge is determined by the expression

$$N = 0.5\, c_x\, \rho\, s\, v^2 = 0.5\, c_x\, \rho\, (l - h)\, D\, v^2$$

At the end of the article two examples of design calculations are given. The authors did not analyze the significance of the described load on the gate in comparison with the design load (hydrostatic pressure). Bibliography: 9 references.

A. P. Berezinskiy

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SOV/24-58-10-30/34

AUTHORS: Perel'man, R. G., Polikovskiy, V. I. (Moscow)

TITLE: Hydraulic Impedance of Rectilinear Channels in the Field of Centrifugal Forces (Gidravlicheskoye soprotivleniye pryamolineynykh kanalov v pole tsentrobezhnykh sil)

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, 1958, Nr 10, pp 150-153 (USSR).

ABSTRACT: A determination was carried out of the hydraulic impedance of smooth brass tubes whose internal diameter was 10, 20 and 28 mm. The tubes were placed radially in a plane which was at right angles to the axis of rotation. Experiments were carried out in air up to Reynolds numbers $R = 7 \times 10^{-5}$. The experimental results are shown in Fig.1, in which the frictional loss coefficient λ is plotted as a function of R and the angular speed n. An expression is derived which gives the hydraulic impedance as a function of the parameters of the tube and the rate of revolution (Eq.6). There are 4 figures and 7 references of which 3 are German and 4 Soviet.

SUBMITTED: July 27, 1957.

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PHASE I BOOK EXPLOITATION 527

Perel'man, Roman Grigor'yevich, Candidate of Technical Sciences

Yadernyye dvigateli (Nuclear Engines) Moscow, Izd-vo "Znaniye", 1958. 54 p. (Series: Vsesoyuznoye obshchestvo po rasprostraneniyu politicheskikh i nauchnykh znaniy. Seriya IV, 1958, no. 4 and 5) 60,000 copies printed.

Scientific Ed.: Nikolayev, N. A.; Ed. of Publishing House: Lanina, L. I.; Tech. Ed.: Streletskiy, I. A.

PURPOSE: The booklet is intended for the general public interested in future developments in the field of atomic energy.

COVERAGE: The author describes in popular language the perspects for utilizing atomic energy, particularly in the field of transportation. No precise descritpion of transportation facilities in the atomic era can as yet be given. The Soviet Union has accumlated considerable experience in the continuous operation of industrial nuclear electric power plants. The Sixth Five Year Plan calls for new nuclear engines and new larger electric power plants, and nuclear icebreakers, one of which is now almost completed. The author describes the advantages of installations of power plants operating on nuclear fuel. He cites as

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an example the recent Soviet achievement in launching December 5, 1957 on the River Neva the nuclear icebreaker "Lenin", which is 134 m. long, 27.6 m. wide, 16 m. high, and has a 16,000 ton displacement and a speed of more than 30 km. per hour. The icebreaker is equipped with launches on its deck and a helicopter on a special platform. Its nuclear engine produces more than 40,000 horsepower. The potential designs of ram jets operating on nuclear fuel are under study, i.e., the VRD (Jets) and the TRD (Turbojets). The future will bring nuclear space ships and the use of controlled thermonuclear reactions. The discovery of a method for controlled transformation of matter into energy in quantum engines will open new cosmic perspectives in rocket technique. Photon and ion rockets will be used in the future. V.V. Zvonkov, Corresponding Member of the USSR Academy of Sciences, is mentioned as the person who supervised the work on nuclear-powered tankers of 15,000 hp. There are 23 references, of which 18 are Soviet, 4 English.

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Nuclear Engines

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AVAILABLE: Library of Congress

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9/25/58

SOV/24-58-11-21/42

AUTHORS: Kovalevskaya, A. Ye. and Perel'man, R. G. (Moscow)

TITLE: On the Heat Exchange in a Field Affected by Centrifugal Forces (O teploobmene v pole deystviya tsentrobezhnykh sil)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1958, Nr 11, pp 92-94 (USSR)

ABSTRACT: M. A. Mikheyev (Refs 1 and 2) studied the heat release from heated rotating rods to the atmosphere (external problem). In earlier work (Ref 3) the authors of this paper studied the heat flow inside a canal (internal problem). The investigations described in this paper are based mainly on the results of this earlier work and relate to determining the hydraulic resistance of straight canals inside a field affected by centrifugal forces. Various authors have published formulae enabling inter-relation in the first approximation of the heat transfer coefficient α and the Nusselt number N_{Nu}. The possibility of using the relations published by Ludwieg (Ref 4) and Kutateladze (Ref 5) (Eqs.1 and 2 of this paper) are determined by the extent to which the heat propagates in the flow along the investigated section. In the experiments carried out by the authors of this paper the

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SOV/24-58-11-21/42

On the Heat Exchange in a Field Affected by Centrifugal Forces

length of the ring section in which the heat transfer was effected consisted altogether of two tube sizes and it can be anticipated, therefore, that the experimental results in the investigated region and the applied length of the heated section will be intermediate relative to those calculated according to the formulae of Ludwieg and of Kutateladze. A sketch of the used experimental set-up is shown in Fig.3. It was found that the experimental results are in satisfactory agreement with the theoretical relations plotted according to the formulae of Ludwieg and Kutateladze. It can be seen from the graph, Fig.2 that an absolute decrease in the flow rate, i.e. of the N_{Re} criterion, will bring about an increase in the difference between the experimentally and the theoretically determined values and the experimentally obtained coefficients will be larger than the calculated values. This is possible due to the relative increase in the intensity of the secondary flows in the case of

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SOV/24-58-11-21/42

On the Heat Exchange in a Field Affected by Centrifugal Forces

decreasing values of the ratio N_{Re} to N'_{Re}.
There are 3 figures and 5 references, 4 of which are Soviet, 1 German.

SUBMITTED: December 31, 1957

Card3/3

PEREL'MAN, R.G., kand.tekhn.nauk

Motors for Galactic ships. Nauka i zhizn' 25 no.7:60-64 Jl '58.
(Space flight) (MIRA 11:9)

124-57-1-531

Translation from: Referativnyy zhurnal, Mekhanika, 1957, Nr 1, p 66 (USSR)

AUTHOR: Perel'man, R. G.

TITLE: Investigation of the Phenomenon of Funnel Formation (Issledovaniye yavleniya voronkoobrazovaniya)

PERIODICAL: Tr. MAI, 1954, Nr 38, pp 100-149

ABSTRACT: The study is devoted to the problem of the formation of a funnel during the outflow of a liquid from a cylindrical container through a circular opening in its horizontal bottom. In the experimental apparatus the funnel was artificially created by means of a whirling motion produced by concentrated jets which were tangentially injected into the container. In his examination of the motion during the stationary outflow of a viscous liquid, the author assumes that part of the head is expended in the maintenance of the whirling motion of the viscous liquid, and that only the remainder of the head is expended "in producing the discharge." The autho. assumes the following law for the distribution of the peripheral velocities c_u in the flow of the whirling viscous liquid:

$$r^x c_u = \text{const} ,$$

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124-57-1-531

Investigation of the Phenomenon of (cont.)

where r is a radius and x is a head-loss coefficient comprising the energy losses due to internal friction and the friction with the walls and bottom of the container. This coefficient is determined experimentally. The author also proposes a formula for the approximate calculation of the pressure distribution in the presence of a funnel. Regarding model tests of the formation of a funnel, the author concludes that the determing influence therein is exerted by the viscosity; hence model tests must conserve the Reynolds number, which is expressed as follows: $R = r\, c_u / \nu$. The determination of the discharge coefficient in the presence of a funnel is also examined. In conclusion a numerical example of the tracing of a funnel profile is set forth.
Bibliography: 7 references

O.F. Vasil'yev, N.A. Pritvits

1. Liquids--Flow--Analysis

Card 2/2

SOV-25-58-7-33/56

AUTHOR: Perel'man, R.G., Candidate of Technical Sciences

TITLE: A Window to the Future (Okno v budushcheye). The Engines of Spaceships (Dvigateli galakticheskikh korabley).

PERIODICAL: Nauka i zhizn', 1958, Nr 7, pp 60 - 64 and p 3 of inner fold (USSR)

ABSTRACT: Fiction. There are 4 drawings.

1. Spaceships--Propulsion

Card 1/1

SHTEYN, L.B. (Leningrad); PEREL'MAN, R.L., professor, zaveduyushchiy; SEMENOV, A.D. dotsent, direktor.

Studies on the active tonus of the lungs with simultaneous bilateral water manometry. Arkh.pat. 15 no.1:45-50 Ja-F '53. (MLRA 6:5)

1. Otdel eksperimental'noy patologii Leningradskogo tuberkuleznogo instituta im.A.Ya. Shternberga (for Perel'man). 2. Leningradskiy tuberkuleznyy institut im. A.Ya. Shternberga (for Semenov). (Lungs)

SHUTSKAYA, Ye.I., kand. med. nauk; Prinimali uchastiye: RABINOVICH, S.Ye., prof.; SLEPTSOVA, A.I., vrach; LIVEN, K.I., vrach; SOKOLOVA, R.I., vrach; PEREL'MAN, R.M., vrach; AL'TMAN, I.M., vrach; SHEPILOV, N.S., kand. veterin. nauk; SVIRIDOV, A.A.

Epidemiological importance of tuberculosis in cattle. Veterinariia 40 no.10:19-20 O'63. (MIRA 17:5)

1. Novosibirskiy nauchno-issledovatel'skiy institut tuberkuleza (all except Shepilov, Sviridov).

CHEREMNYKH, L.P., kand.med.nauk; PEREL'MAN, R.M.

Clinicomorphological comparisons in chronic primary tuberculosis of the lungs in children. Probl. tub. no.2:74-79 '64.

(MIRA 17:12)

1. Novosibirskiy nauchno-issledovatel'skiy institut tuberkuleza (dir. M.V.Svirezhev).

FEOFILOV, G.L.; PEREL'MAN, R.M.; KHRAMOVA, L.P.

Bronchological examination of children with chronic pulmonary tuberculosis. Probl. tub. 42 no.1:16-21 '64. (MIRA 17:8)

1. Institut eksperimental'noy biologii i meditsiny (dir. Yu.I. Borodin) Ministerstva zdravookhraneniya RSFSR i Novosibirskiy nauchno-issledovatel'skiy institut tuberkuleza (dir. M.V. S Svirezhev).

PEREL'MAN, R.S.

Azerbaijan State Medical Library of the Ministry of Public Health of the Azerjaijan S.S.R. Azerb. med. zhur. no.11:71-73 N '60. (MIRA 13:12)

1. Ispolnyayushchiy obyazannosti direktora Azerbaydzhanskoy gosudarstvennoy nauchnoy meditsinskoy biblioteki Ministerstva zdravookhraneniya Azerbaydzhanskoy SSR.
(AZERBAIJAN—MEDICAL LIBRARIES)

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3RD AND 4TH ORDERS

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Problems in the production of ammonium nitrate and ammonium sulfate. S. Perel'man and V. Klevke. *J. Chem. Ind.* (U. S. S. R.) 17, No. 1, 28–31(1940).—Appl is discussed. Caking of NH_4NO_3 can be prevented by drying the crystals below 32°. H. M. Leicester

COMMON ELEMENTS

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1ST AND 2ND LETTER

3RD AND 4TH ORDERS

CA

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PROCESSES AND PROPERTIES INDEX

The conversion of gypsum by solutions of ammonium carbonate. S. Perel'man and V. Rosler. *J. Chem. Ind.* (Moscow) 1935, No. 1, 28-37.—An excess of 8% of $CaSO_4.2H_2O$ is treated with a 40% soln. of $(NH_4)_2CO_3$ at 40-60°. If the reagents are mixed slowly and equally, the ppt. of $CaCO_3$ filters well and requires little washing. The reaction is complete in 1.5-2 hrs. The filtrate contains 0.2% free NH_3, which is neutralized by H_2SO_4. The yields of $CaCO_3$ and $(NH_4)_2SO_4$ are 92-3 and 96.8%, resp. The $CaCO_3$ contains 17-20% H_2O, and when dry gives a fine noncaking powder. If $2CaSO_4.H_2O$ or phosphogypsum is used in the reaction, a poor quality of $CaCO_3$ is obtained. H. M. Leicester

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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PROCESSES AND PROPERTIES INDEX

CA

The decomposition of Vyatka phosphorite by hydrochloric acid and the precipitation of the obtained phosphoric acid by limestone and milk of lime. I. Mirkin, S. Perel'man and I. Nikonova. *J. Chem. Ind.* (Moscow) 1933, No. 7, 56-62; cf. *C. A.* 25, 4050.—The full theoretical amt. of HCl must be used when this acid decomposes phosphorite. It is best to use 10% HCl soln., to avoid too much later washing. The phosphorite does not have to be finer than 30-mesh. Finely ground limestone will ppt. all the H_3PO_4 formed if sufficient time is allowed, but in practice it is best to end the neutralization with $Ca(OH)_2$. H. M. Leicester

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

CA

The alkaline absorption of nitrogen oxides. S. [illegible]man and L. Kantorovich. *J. Chem. Ind.* (U. S. S. R.) 17, No. 6, 3-9(1940).—Absorption of NO_2 and N_2O_3 depends on time of contact of gas and soln. and on pressure. At atm. pressure, oxidation of NO should be carried out before absorption, but at 6 atm. the rate of the reaction is so rapid that it does not hinder absorption of NO_2. In Na_2CO_3 solns., N_2O_3 is absorbed faster than NO_2. These solns. must contain at least 4 g. Na_2CO_3 per l. at 1 atm. and 8-10 g. per l. at 6 atm. $Ca(OH)_2$ solns. absorb slightly faster than Na_2CO_3 solns., and suspensions of $CaCO_3$ absorb most slowly of all, but are economical to use because of cheapness. When the d. of the absorbing solns. is increased by the presence of large amts. of nitrate and nitrite, the rate of absorption is lowered. Scrubbers are more efficient for the absorption than is bubbling the gas through the soln.

H. M. Leicester

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

BC

B-I-8

PROCESSES AND PROPERTIES INDEX

Conversion of gypsum by aqueous ammonium sulphate. S. P[illegible] and V. B[illegible] (J. Chem. Ind. Russ., 1939, 12, No. 1, 29—37).—[illegible]—[illegible]% conversion of gypsum (I) and 96—[illegible]% utilisation of $(NH_4)_2CO_3$ is obtained from powdered (I) ([illegible]-mesh; 5% excess) and 40% aq. $(NH_4)_2CO_3$ (2 hr. at [illegible]—[illegible]°). The resulting 40% aq. $(NH_4)_2SO_4$ (II) contains 0·2—0·25% of NH_3, which should be neutralised with H_2SO_4. The ppt. contains $CaCO_3$ 85, (I) 10, mechanical admixtures 4—6, (II) 0·8—1, and H_2O 20%.

R. T.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

BC

B-1-8

DECOMPOSITION OF VYATKA PHOSPHORITE BY HYDROCHLORIC ACID, AND THE PREPARATION OF PHOSPHORIC ACID BY PRECIPITATION WITH CALCIUM CARBONATE OR MILK-OF-LIME. I. Mirkin, S. Perelman, and I. Nikonov (J. Chem. Ind. Russ., 1933, 10, No. 7, 56--62). --98% extraction of H_3PO_4 is obtained by using sufficient 10% HCl to convert the entire Ca present into $CaCl_2$. The phosphorite (I) should be in the form of particles passing 20mesh. H_3PO_4 is pptd. by $Ca(OH)_2$ or $CaCO_3$ from the solution obtained after separation from insol. matter (II) (about 25% of the wt. of (I) taken). (II) settles very slowly, and is difficultly separated by filtration; the product obtained by pptn. of H_3PO_4 without previously eliminating (II) had a P_2O_5 content of 28%, as compared with 40% when (II) was absent, and only 70% of the P_2O_5 was assimilable. R. T.

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

3RD AND 4TH ORDERS

Ca

The decomposition of Vyatka phosphorite by hydrochloric acid and the precipitation of the obtained phosphoric acid by limestone and milk of lime. I. Mirkin, S. Perel'man and I. Nikonova. *J. Chem. Ind.* (Moscow) **1933**, No. 7, 58-62; cf. *C. A.* **25**, 4650.—The full theoretical amt. of HCl must be used when this acid decomposes phosphorite. It is best to use 10% HCl soln. to avoid too much later washing. The phosphorite does not have to be finer than 20-mesh. Finely ground limestone will ppt. all the H_3PO_4 formed if sufficient time is allowed, but in practice it is best to end the neutralization with $Ca(OH)_2$. H. M. Leicester

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

3RD AND 4TH ORDERS

PROCESSES AND PROPERTIES INDEX

The crystallization of nitrogen-containing salts, ammonium sulfate and sodium nitrate. [illegible] and E. Strakhova. *J. Chem. Ind.* (U. S. S. R.) 13, No. 7, 29-31 ([illegible]).—Large crystals of $(NH_4)_2SO_4$ are obtained by crystn. from a soln. in which the acidity does not exceed 1-3%. The presence of Fe_2O_3 in the soln. causes formation of smaller crystals, but FeO has the opposite effect. Addn. of H_3PO_4 improves the crystals, especially when Fe_2O_3 is present. Superphosphate and phosphorite meal have a similar effect if the acidity is low, but at higher acidities they give impure crystals. $NaNO_3$ crystals formed in neutral or acid solns. are larger and better formed than those from alk. solns. The presence of NaCl and $NaNO_3$ in the solns. has no effect on $NaNO_3$ crystals and Fe_2O_3 causes only a slight decrease in their size.

H. M. Leicester

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

PERBL'MAN, S. L.

21995 PERBL'MAN, S. L. Fiziologicheskiy analiz dannykh lobelinovoy proby pri opredelenii vremeni krugooborota krovi. Vracheb. delo, 1949, No. 7, stb. 575-78.

SO: Letopis' Zhurnal'nykh Statey, No. 29, Moskva, 1949.

HARBUTT, K.I.; PEREL'MAN, S.M.; PRAGER, I.A.; KHARLAKOV, V.A.

Proportional X-ray quantum counters and their use for X-ray spectrum analysis. Izv.AN SSSR.Ser.fiz. 27 no.3:430-437 Mr '63. (MIRA 16:2)

(X-ray spectroscopy)

BARONIN, V.N.; BETIN, Yu.P.; VERKHOVSKIY, B.I.; IVANOV, A.I.; PERL'MAN, B.M.; PRAGER, I.A.; KHARLAKOV, V.A.; SHELKOV, L.S.

Crystalless X-ray spectrometer with stabilization of the position of the amplitude of the spectrum of a proportional counter. Zav. lab. 30 no.4:498-500 '64. (MIRA 17:4)

1. Konstruktorskoye byuro "TSvetmetavtomatika".

S/048/63/027/003/023/025
B106/B238

AUTHORS: Narbutt, K. I., ~~Perel'man, S. M.~~, Prager, I. A., and Kharlakov, V. A.

TITLE: An attempt to use proportional counter tubes for X-ray spectral analysis

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Seriya fizicheskaya, v. 27, no. 3, 1963, 430-437

TEXT: Two types of proportional counter tubes were tested, type 1 with its entry window in the side, and type 2 with a window in the support of the counter. All the windows were made of hermetic beryllium 150 - 200 μ thick. Type 1 instruments were filled with either argon, krypton or xenon, and in every case 10 % isopentane was added as an extinguisher. The anode filaments in type 2 were fixed straight to the support in order to reduce the dead space and the action of boundary effects on the amplitude resolution of the counter. The filling is a krypton-isopentane mixture at a pressure of c. 400 mm Hg. The electronic counting device is made up of a

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B106/B238

An attempt to use ...

pre-amplifier and a standard CCA (SSD) diffractometer counter unit. The amplitude distribution for characteristic X lines of various energies was studied under various conditions using a type 1 counter filled with argon. The mean pulse height was found to depend linearly on the quantum energy of the exciting radiation. The way in which the energy resolution of the instruments depends on the energy of the radiation to be recorded was also determined. The amplitude distribution of the fluorescent X-radiation was measured for the elements K to Cs in the periodic table using the three sorts of type 1 tube. In argon, a small argon loss peak occurs even in the vanadium spectrum, but L series analysis is possible from silver onwards. In krypton, the K spectra of the elements up to selenium are free of irregularities, but from rubidium onwards a distinct krypton loss peak occurs. The xenon loss peak is very small in xenon filled tubes, which are therefore highly suitable for K series analyses on elements up to Cs, and L series analyses thereafter. The following were also determined for all the counter tubes: the dependence of the pulse height on the working voltage; the dependence of the duration of the pulse

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B106/B238

An attempt to use ...

on the load resistance; the dependence of the resolution on the working voltage, i. e. the gas amplification factor, and on the load resistance. The resolution is practically independent of the working voltage when this is near 400 v for type 1 counters or 150 v for type 2 counters. The characteristics of these counters does not change in course of two years operation. There are 13 figures.

Card 3/3

F T

4554. RAPID METHOD FOR DETERMINING HYDROGEN SULPHIDE AND PHOSPHINE IN ACETYLENE. Perel'man, S. S. and Ledyakina, T. M. (Zavodskaya Lab., 1945, 11, 810-14; Chem. Abstr., 1947, 41, 1176).

Pass the gas through NaOCl solution to absorb H_2S and PH_3 by oxidation to H_2SO_4 and H_3PO_4. To the resulting solution add 5 ml. of 6 N. HCl, evaporate to dryness, take up the residue in water, and transfer to a 200-ml. volumetric flask. To an aliquot part, add acid molybdate reagent and reduce the resulting phosphomolybdate to Mo blue by adding 5 ml. of solution prepared from 90 g. $Na_2SO_3 \cdot 7H_2O$ + 2 g. hydroquinone per 1. Compare with a standard in a Duboscq colorimeter after 30 min. In an another aliquot determine the H_2SO_4 by precipitating it as $BaSO_4$ with a measured volume of 0.01 N. $BaCl_2$ solution, filtering off the $BaSO_4$, precipitating the excess Ba^{+2} with a measured volume of 0.015 N. $K_2Cr_2O_7$ solution + NH_4OH, filtering off the $BaCrO_4$ precipitate, and measuring the excess $Cr_2O_7^{-2}$ by the diphenylcarbazide reaction in dilute H_2SO_4, eventually measuring the colour in a colorimeter.

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

4-I-8

BC

Production of thermo-phosphates from Khibinsk apatite. R. I. Volfkovich and S. B. Perelman (Udobr. Urozhai, 1930, 2, 570—580).—Flotation afforded a product containing 40·9% P_2O_5; this was heated for 30 min. at 1200° with 42% of Na_2CO_3. Optimal conditions for other samples (27·13, 19·47% P_2O_5) were also determined. Addition of SiO_2 (10%) or $CaCO_3$ slightly increased the amount of decomp. The fertiliser value of thermo-phosphate is equal to that of Thomas slag, but slightly inferior to that of superphosphate.

CHEMICAL ABSTRACTS.

PERELMAN, S. S.
D. S. DOROFEEV, Trans. Sci. Inst. Fertilizers (USSR) No. 101,
62-73, 1933

15

CA

Decomposition of phosphorite with hydrochloric acid and with mixtures of hydrochloric acid, sulfuric acid and ammonium chloride. S. I. Volfkovich and S. S. Pashmazian. *Udobrenie i Urozhai* 3, 378-89(1930); *Chem. Zentr.* 1930, II, 119; cf. *C. A.* 25, 2807.—Wyatka phosphorite, contg. 26.7% P_2O_5, 8.1% CO_2, 4.8% $(Al, Fe)_2O_3$, yielded HCl exts. with 8-9% P_2O_5. 3.04 parts 26.8% HCl decompose 95-6% of the mineral. The optimal HCl concn. is 20%. The exts. contain 0.5-0.8% sesquioxides which were extd. up to 21-40% from the mineral. A mixt. of HCl and H_2SO_4 acts with the same good result. Addn. of NH_4Cl decreases the rate of decompn. Alfred Burgers

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1ST AND 2ND ORDERS

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COMMON ELEMENTS

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ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

CO

15

Experiments on the production of thermophosphates from the Khibinsk apatite. S. I. VOLFKOVICH AND S. S. PERELMAN. *Udobrenie i Urozhai (Fertilizers and Crops)* 2, 570-8[illegible](1930).—By a [illegible] product was obtained from the Khibinsk apatite with a 40.5% P_2O_5 content. This and 2 other samples contg. 27.12 and 19.47% P_2O_5 were fused with Na_2CO_3. By using 30.2 parts of the 40.5% P_2O_5 sample for 100 parts of the phosphate at 900-1200° a product was obtained with a 70% coeff. of decompn., the latter representing the ratio of citrate-sol. P_2O_5 to the total. With a 25% excess of Na_2CO_3 the coeff. increases irrespective of the temp. from 900° to 1200°. With a 50% increase the proportionality between the Na_2CO_3 and increase in P_2O_5 disappears. At 1100° the coeff. drops from 75.3 to 60.7% and then again increases at 1200° to 93.6%. At 1300° the mixt. fuses, but there is no increase in P_2O_5. The optimum conditions were found to be at 1200° with 1.5 times the amt. of soda used originally, *i. e.*, 45 parts of Na_2CO_3 to 100 parts of apatite. With the 27.1% P_2O_5 sample at 1000-1200° with 20 parts of Na_2CO_3 to 100 parts of phosphate the coeff. of decompn. was 70-80%. A 25% increase of Na_2CO_3 increased the coeff. of decompn. almost to 100%. Even at 900° such a mixt. gave an 83.2% coeff. With the 19.5% P_2O_5 sample at 1200° with 22 parts of Na_2CO_3 to 100 parts of the phosphate almost 100% of the phosphate became citrate sol. Addns. of 10% SiO_2 to the mixt. slightly increased the coeff. of decompn. SiO_2 alone had no effect. An increase of the SiO_2 to 20% produced neg. results. Addns. of $CaCO_3$ alone had no effect, but with the Na_2CO_3 an increase in the coeff. took place. The time factor of heating the mixt. brought out the fact that 30 min. gives the optimum. The cooling of the mix immediately after 30 min. heating increased the soly. of the product. Heating with various chlorides gave neg. results. With Na_2SO_4 and charcoal a product was obtained with a coeff. of 80%. Vegetation expts. with thermophosphates show that it is just as good as Thomas slag, but it is slightly inferior to superphosphate.

J. S. JOFFE

PROCESSES AND PROPERTIES INDEX

The conversion of sodium nitrite under pressure. S. S. Perel'man, E. N. Strakhova and R. Kh. Telesova. J. Chem. Ind. (U. S. S. R.) 15, No. 12, 28-30(1938). When 40% $NaNO_2$ solns. are warmed with HNO_3 under pressure and air, or better, O_2 is blown through the soln., conversion to $NaNO_3$ occurs easily. Less HNO_3 is required than at atm. pressure. H. M. Leicester

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

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CA

7

A rapid method for determining hydrogen sulfide and phosphine in acetylene. S. S. Perel'man and T. M. Lelyakina. *Zavodskaya Lab.* 11, 810-11(1945).—Pass the gas through NaOCl soln. to absorb H_2S and PH_3 by oxidation to H_2SO_4 and H_3PO_4. To the resulting soln. add 5 ml. of 6 *N* HCl, evap. to dryness, take up the residue in water, and transfer to a 200-ml. volumetric flask. To an aliquot part, add acid molybdate reagent and reduce the resulting phosphomolybdate to Mo blue by adding 5 ml. of soln. prepd. from 80 g. $Na_2SO_3.7H_2O$ + 2 g. hydroquinone per l. Compare with a standard in a Duboscq colorimeter after 30 min. In another aliquot det. the H_2SO_4 by pptg. it as $BaSO_4$ with a measured vol. of 0.01 *N* $BaCl_2$ soln., filtering off the $BaSO_4$ ppt., pptg. the excess Ba^{++} with a measured vol. of 0.015 *N* $K_2Cr_2O_7$ soln. + NH_4OH, filtering off the $BaCrO_4$ ppt., and measuring the excess $Cr_2O_7^{--}$ by the diphenylcarbazide reaction in dil. H_2SO_4, eventually measuring the color in a colorimeter. W. R. Henn

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

PROCESSES AND PROPERTIES

Ca

The preparation of dicalcium phosphate from phosphorite. S. S. PERELMAN AND I. N. NIKONOVA. *J. Chem. Ind.* (Moscow) 1932, No. 12, 21-4.—Crude H_3PO_4 from phosphorite is treated with $Ca(OH)_2$ at p_H 2-4. Fe and Al ppt. as phosphates and F as CaF_2. After filtration, the soln. is neutralized, and almost pure $CaHPO_4.2H_2O$ ppts. Slight amts. of As remain in soln. The $CaHPO_4$ thus obtained is cheap and can be used for animal feeding. H. M. LEICESTER

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

PROCESSES AND PROPERTIES INDEX

18

CA

Analysis of gases and determination of the degree of absorption in nitric acid systems. S. S. Perel'man and V. I. Tikhomirov. *Zavodskaya Lab.* 11, 905-10(1945). Equations are derived to calc. the degree of absorption of N oxides in each column of HNO_3 systems or in any part of the absorption system. It is also possible to det. the quantity of N oxides in the condensate if the gas condensers are regarded as an absorption region of the system.

W. R. Henn

ASD-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

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3RD AND 4TH ORDERS

CA

15

An economic survey of the production of double superphosphates. B. A. Voronenko and S. S. Perelman. J. Chem. Ind. (Moscow) 1932, No. 3, 6-12. H. M. L.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

PEREL'MAN, S.T.

Open-hearth furnace or oxygen converter? Stal' 22 no.2:124-125 F '62. (MIRA 15:2)
Stal' 22 no.2:124-125 F '62.
(Steel--Metallurgy)

PROCESSES AND PROPERTIES INDEX

a-1

BC

Influence of inert additions on the lower limit of the photochemical explosion of the $H_2 + Cl_2$ mixture. F. A. Lavrov and T. Perelman (Acta Physicochim. U.R.S.S., 1935, 2, 91—102).—The influence of excess of H_2 or Cl_2 and additions of N_2, A, CO_2, and HCl on the lower explosion pressure P of stoicheiometric H_2+Cl_2 mixtures has been studied. P is a min. at 70% Cl_2 and then increases linearly with the pressure of added gas in accordance with a theoretical equation. Assuming equal deactivation probabilities ε in each case, the ratio addition concn./[N_2] for a given P has been calc. and good agreement obtained with experimental ratios, except in the case of HCl, when $\varepsilon_{N_2} = 2{\cdot}2\varepsilon_{HCl}$. It is supposed that HCl becomes excited and may then activate another Cl_2. The occurrence of $P_{min.}$ at 70% Cl_2 is ascribed to excited Cl_2 in the rôle of chain carrier. R. S.

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

PROCESSES AND PROPERTIES INDEX

CA

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The influence of inert admixtures on the lower limit of the photochemical ignition of hydrogen and chlorine mixtures. F. A. Lavrov and T. Perelman. *Acta Physico-chim. U. R. S. S.* 2, 91-102(1935)(in German).--With a C arc as light source the lower limit of ignition is about 30 mm. for a 70% Cl_2 30% H_2 mixt. At 31.5, 40, 80 and 76% Cl_2 the lower pressure limits are 330, 60, 50 and 350 mm. Up to 10%, O_2 does not change the lower ignition limit; then its effect is strong and linear, from 50 to 180 mm. for the 80% mixt. For N_2, A, CO_2 and HCl admixts., up to about 5% has no effect; after that the effect on the pressure is proportional to the percentage of gas added. The relative effects (slopes) are, resp., 22, 26, 28 and 80% of gas to raise the ignition pressure to 65 mm. These ratios agree quite well with those calcd. from gas kinetic collision-frequency data. The mechanism of the process is held to be an activation of Ci, which then reacts with H_2. The H_2 + O_2 ignition is held to consist of a primary photochem. activation of O_2 mols. F. H. R.

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001240010013-9"

PROCESSES AND PROPERTIES INDEX

CA

3

The manufacture and use of the photoelectric step spectrophotometer. V. A. Sukhikh and T. B. Perel'man. *Legkaya Prom.* 17, 132 (1938); *Chem. Zentr.* 1939, II, 2445.—A spectrophotometer is described which operates with 2 Se cells in differential connection. The instrument is recommended for use in the *dye industry*. Reference is made to appropriate literature. M. G. Moore

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

PROCESSES AND PROPERTIES INDEX

BC

11-1

Preparation of colour filters. V. A. BUCKOV and T. B. PERELMAN (Zavod. Lab., 1937, 6, 730—730).—The filters are prepared by spraying dye solutions on to glass surfaces. R. T.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

1ST AND 2ND ORDERS

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3RD AND 4TH ORDERS

CA

Preparation of color filters. V. A. Sukhikh and I. B. Perelman. *Zavodskaya Lab.* **6**, 738-9(1937).—The filters are prepd. by spraying dye solns. on to glass surfaces.

B. C. A.

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

85437

S/170/60/003/011/008/016
B019/B056

11.9200

AUTHOR: Perel'man, T. L.

TITLE: The Temperature Distribution in a Cylinder With Internal Heat Sources and Its Cooling by a Turbulent Liquid Flow

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, 1960, Vol. 3, No. 11, pp. 72-76

TEXT: In the case of high liquid velocities and a small thickness of the boundary layer, it may be approximately assumed for the zone of the steady flow that the quantity of heat transferred from the heated cylinder is used for heating the center of the liquid flow. For this simplification, the heat exchange differential equations may be written down in the following manner:

$$c\varrho \frac{\partial t(r,z,\tau)}{\partial \tau} = \lambda \left\{\frac{1}{r}\frac{\partial}{\partial r}\left(r\frac{\partial t(r,z,\tau)}{\partial r}\right) + \frac{\partial^2 t(r,z,\tau)}{\partial z^2}\right\} + Q(r,z,\tau) \quad (1)$$

$$c_{liqu}\varrho_{liqu}\left\{\frac{\partial t_{liqu}(z,\tau)}{\partial \tau} + v\frac{\partial t_{liqu}}{\partial z}\right\} = \alpha\frac{P}{S_{liqu}}\left[t(z,R,t) - t_{liqu}(z,\tau)\right] \quad (2)$$

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85437

The Temperature Distribution in a Cylinder With Internal Heat Sources and Its Cooling by a Turbulent Liquid Flow

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In the present paper, an exact solution of this system is obtained. The boundary- and initial conditions are given. This system is transformed into a system of two linear integral equations by means of a Laplace transform. The latter are transformed into a linear Fredholm equation of second kind and solved in the usual manner. A detailed investigation of the solution will be given in a later paper. The author thanks Academician A. V. Lykov for discussing the results obtained. There are 2 Soviet references.

ASSOCIATION: Institut energetiki AN BSSR, g. Minsk (Institute of Power Engineering of the AS BSSR, Minsk)

SUBMITTED: April 11, 1960

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S/170/60/003/005/016/017
B012/B056

AUTHOR: Perel'man, T. L.

TITLE: The Temperature Field in a Finite Cylinder With Inner Sources

26

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, 1960, Vol. 3, No. 5, pp. 138-144

TEXT: First, the equation (1) of thermal conductivity for the problem with cylinder symmetry and a density Q of the heat sources is written down. One front side of the cylinder is assumed to be heat-insulated, whereas the temperature of the other front side is constant and equal to the temperature of the medium surrounding the cylinder. Formula (2) is written down for the convective heat exchange occurring in all cases on the cylinder jacket. New variables are introduced, and (1) and (2) are transformed into formulas (4) and (5). Equation (4) is solved under the conditions (5), and a differential equation of the first order is obtained. By using the integral transformation, formula (6) is finally obtained for temperature. From this formula there results the solution of the problem for

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The Temperature Field in a Finite Cylinder With Inner Sources

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a finite cylinder with arbitrary source density under the boundary conditions (2). A special case is then investigated, in which the heat source density has the form of equation (10). For this case, formula (12) is obtained for temperature. In conclusion, the results are given for some simple boundary conditions at the front sides of the cylinder, which differ from the boundary condition (5b). Academician A. V. Lykov and the author discussed the results obtained by this investigation. The results are of interest for the study of heat transfer in nuclear reactors. There are 5 Soviet references.

ASSOCIATION: Institut energetiki AN BSSR, g. Minsk (Institute of Power Engineering of the AS BSSR, Minsk)

Card 2/2

S/170/60/003/010/022/023
B019/B054

AUTHORS: Yermakov, V. S., Perel'man, T. L.

TITLE: Problems of Nuclear Physics (II All-Union Conference on Low- and Medium-energy Nuclear Reactions)

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, 1960, Vol. 3, No. 10, pp. 139-143

TEXT: The II Vsesoyuznaya konferentsiya po yadernym reaktsiyam pri malykh i srednikh energiyakh (II All-Union Conference on Low- and Medium-energy Nuclear Reactions) was organized in Moscow by the AS USSR on July 21-28, 1960. I. M. Frank, Corresponding Member of the AS USSR, headed the organizing committee. In his opening speech, he pointed out that the investigation of low-energy nuclear reactions quite naturally deals with the problems of nuclear structure. N. A. Vlasov gave a survey of experimental investigations of systems containing less than eight nucleons in the nucleus. Among other things, this report dealt with the existence of a tetraneutron, the isotope H^8, and some hydrogen isotopes, as predicted by Ya. B. Zel'dovich, V. I. Gol'danskiy, and A. I. Baz'. A. I. Baz'

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Problems of Nuclear Physics (II All-Union Conference on Low- and Medium-energy Nuclear Reactions)

S/170/60/003/010/022/023
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gave a survey of theoretical investigations of these systems. He mentions the investigation of the three-particle problem for short-range forces carried out by G. V. Skornikov and K. A. Ter-Martirosyan (Ref. p. 140). L. D. Landau made some critical remarks during the subsequent discussion, mainly on missing levels in one of the mirror nuclei. Further, Ya. B. Zel'dovich stated that the existence of H^8 is very likely. V. I. Gol'danskiy suggested the hypothetical reaction $Be^9(\pi^-,p)He^8$ for the experimental proof of the existence of H^8. I. S. Shapiro showed in his report that the π-meson capture does not only supply information on elementary particles, but also on the structure of light nuclei. A. A. Ogloblin and V. G. Neudachin gave a survey of experimental and theoretical investigations on direct interactions of nuclei. A. P. Klyucharev (Khar'kov) spoke about elastic proton scattering. P. E. Nemirovskiy dealt with inelastic nucleon scattering. In the discussion of this report A. S. Davydov discussed the use of the optical model for light nuclei. I. Kh. Lemberg reported on investigations of the Coulomb excitation of nuclear levels by multiply charged ions. These investigations were carried out at the Leningradskiy fiziko-tekhnicheskiy institut AN SSSR (Leningrad

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Institute of Physics and Technology of the AS USSR). In the discussion of this report, experimental results obtained in Dubna were given on the excitation of rotational levels by μ-mesonic transitions of U^{238} atoms. V. I. Gol'danskiy reported on the possibility of a two-proton activity of some nuclei. In an attempt made to explain theoretically the results obtained by Almquist, A. S. Kompaneyets suggested the model of a two-nucleus quasimolecule $C^{12}-C^{12}$. A. I. Baz' reported on his calculations of a nuclear molecule model. L. D. Landau and A. I. Alikhanov took part in the discussion of R. Moessbauer's report. F. L. Shapiro gave a survey of experimental and theoretical investigations of the resonance scattering of γ-quanta carried out by A. I. Alikhanov et al. Investigations carried out at the FIAN and MGU are also considered. L. Ye. Lazarev and A. M. Baldin reported on experimental investigations of photonuclear reactions, L. V. Groshev and S. P. Tsytko on the radiation capture of nucleons. A. S. Davydov reported on non-axially symmetric nuclei, Yu. T. Grin on the superfluidity of nuclear substance which he had discovered together with A. B. Migdal. Reports delivered by American, Canadian, British, German, and Italian scientists are also discussed. There is 1 Soviet reference.

PERELʹMAN, T.L.

Temperature fields in a finite cylinder with internal sources of heat and a cooling glow of liquid. Dokl.AN BSSR 4 no.4:156-159 Ap '60. (MIRA 13:10)

1. Institut energetiki AN BSSR. Predstavleno akad. AN BSSR A.V. Lykovym.

(Thermodynamics)

PEREL'MAN, T.L.; ATENKOV, S., tekhn. red.

[Heat transfer in a laminar boundary layer during flow over a thin plate containing internal sources; Conference on Heat and Mass Transfer, Minsk, 1961] Teploobmen v laminarnom pogranichnom sloe pri obtekanii tonkoi plastiny s vnutrennimi istochnikami; soveshchanie po teplo-i massoobmenu, g. Minsk, 1961 g. Minsk, 1961. 9 p. (MIRA 15:2)
(Heat—Transmission) (Laminar flow) (Boundary layer)

PEREL'MAN, T. L.

" Conjugate tasks of heat-exchange."

Report presented at the 1st All-Union Conference on Heat- and Mass-Exchange, Minsk, BSSR, 5-9 June 1961.

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001240010013-9"

PEREL'MAN, T. L. and ANISIMOV, S. I.

"Diffusion of charged particle in the presence of recombination."

Report presented at the 1st All-Union Conference on Heat- and Mass- Exchange, Minsk, BSSR, 5-9 June 1961

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S/170/61/004/004/007/014
B108/B209

11.9200

AUTHOR: Perel'man, T. L.

TITLE: The heat exchange in a laminar flow through a tube

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, v. 4, no. 4, 1961, 43 - 48

TEXT: The author presents the combined solution of the heat conduction equations of a liquid flowing through a tube and of the wall of this tube. The study chiefly concerns the entrance region of a tube of radius R and wall thickness h. The Poiseuille velocity profile in the tube, $u = u_o(1 - r^2/R^2)$ (u_o - maximum velocity at r = 0), is transformed into $u = u_o\frac{2y}{R}$, which holds for the entrance region. In this case, y = R - r replaces r, with consideration of only $y \ll R$. With the temperatures of the liquid and of the wall, $\Theta(x,y)$ and $t(x,y)$, respectively, the following is the boundary problem:

$$\frac{2y}{R} u_0 \frac{\partial \theta}{\partial x} = \chi \frac{\partial^2 \theta}{\partial y^2}, \quad 0 \leqslant x < \infty, \quad 0 < y < \infty \left(\chi = \frac{k_l}{c_p \rho_l} \right). \quad (1)$$

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The heat exchange in a ...

$$\frac{\partial^2 t}{\partial x^2} + \frac{\partial^2 t}{\partial y^2} = 0, \quad 0 \leqslant x < \infty, \quad -h \leqslant y \leqslant 0, \tag{2}$$

$$\theta\Big|_{y=+0} = t\Big|_{y=-0}, \tag{3}$$

$$-k_f \frac{\partial \theta}{\partial y}\Big|_{y=+0} = -k_s \frac{\partial t}{\partial y}\Big|_{y=-0} \tag{4}$$

$$\theta\Big|_{x=0} = 0, \tag{5}$$

$$\theta\Big|_{y=\infty} = 0. \tag{5'}$$

$$t\Big|_{y=-h} = t_0. \tag{6}$$

$$\frac{\partial t}{\partial x}\Big|_{x=0} = 0. \tag{7}$$

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For the solution of this system, the author introduces the new variable

$$z = \frac{2}{3}\frac{y^{3/2}}{\gamma^{1/2}}\left(\gamma = \frac{\chi R}{2u_0}\right). \quad (8)$$

into Eq. (1). With this substitution the expression

$$\theta(x) = b\int_0^x \frac{p(y)}{(x-y)^{2/3}}\,dy. \quad (16)$$

is obtained for the temperature of the liquid at the wall. In this expression, $b = \beta/2^{1/3}\Gamma(2/3)$ and $p(x)$ a function that originates from the condition (4) after substitution of (8): $-p(x) = \frac{\partial t}{\partial y}\Big|_{y=0}$. The solution of Eq. (2) has the form

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$$t(x, y) = t_0 - \frac{2}{\pi}\int_0^\infty \frac{\mathrm{sh}\,\alpha(h+y)}{\mathrm{ch}\,\alpha h}\,\frac{\cos\alpha x}{\alpha}\,p_c(\alpha)\,d\alpha, \tag{17}$$

where

$$p_c(\alpha) = \int_0^\infty p(x)\cos\alpha x\,dx.$$

Accordingly, the temperature within the tube is

$$\theta(x) = t_0 - \frac{1}{\pi}\int_0^\infty \ln\left[\mathrm{cth}\,\frac{\pi(x+y)}{4h}\,\mathrm{cth}\,\frac{\pi|x-y|}{4h}\right] p(y)\,dy. \tag{18}$$

For $x/h \gg 1$ (far from the wall) Eq. (18) assumes, after some transformations, the form $\Theta(x) \approx t_0 - hp(x)$. From this equation and Eq. (16), the second-kind Volterra integral equation is obtained for $p(x)$;

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$$p(x)=\frac{t_0}{h}F(\xi), \tag{20}$$

$$\theta(x)=t_0[1-F(\xi)], \tag{21}$$

$$F(\xi)=\frac{3\sqrt{3}}{2\pi}\int_0^\infty\frac{e^{-\xi z^3}}{z^2+z+1}dz, \tag{22}$$

where ξ is a dimensionless parameter:

$$\xi=\frac{1}{6}\left[\frac{\Gamma(1/3)}{\Gamma(2/3)}\right]^3\frac{1}{x^3}\left(\frac{R}{h}\right)^2\frac{1}{\mathrm{Pe}}\frac{x}{h}; \tag{23}$$

Pe is the Peclet number, equaling the product of Reynold's and Prandtl's number. For not too great ξ, Table 1 gives the values of the integral (22). For great ξ,

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$$F(\xi) \sim \frac{\sqrt{3}}{2\pi} \sum_{n=0}^{\infty} a_n \Gamma\left(\frac{n+1}{3}\right) \frac{1}{\xi^{\frac{n+1}{3}}} \quad (24),$$

where a_n is determined from $\Phi(z) = \sum_{n=0}^{\infty} a_n z^n$; $\Phi(z) = \frac{1}{z^2+z+1}$; ($a_0 = 1$, $a_1 = -1$, $a_2 = 0$, $a_3 = 1$, ...). The coefficient of local heat exchange and the local Nusselt number are given by

$$\alpha = k_s \frac{p(x)}{\theta(x)}, \quad (25)$$

$$\mathrm{Nu}_x = \frac{1}{x} \frac{p(x)}{\theta(x)} x, \quad (25').$$

The conditions for the validity of the solutions are 1) $x/h \gg 1$; 2) $50 < \mathrm{Pe}\,\frac{R}{x} < 2500$. There are 1 table and 11 references: 4 Soviet-bloc and 7 non-Soviet-bloc.

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The heat exchange in a ...

ASSOCIATION: Institut energetiki AN BSSR, g. Minsk
(Institute of Power Engineering AS BSSR, Minsk)

SUBMITTED: February 6, 1961

Таблица 1

ξ	$F(\xi)$	ξ	$F(\xi)$	ξ	$F(\xi)$	ξ	$F(\xi)$
0	1,0000	0,5	0,5131	1,0	0,4517	2,0	0,3921
0,1	0,6475	0,6	0,4887	1,2	0,4367	2,5	0,3809
0,2	0,5896	0,7	0,4826	1,4	0,4229	3,0	0,3599
0,3	0,5564	0,8	0,4703	1,6	0,4115	4,0	0,3393
0,4	0,5301	0,9	0,4608	1,8	0,4025	10,0	0,2719

Table 1

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26.2181

AUTHOR: Perel'man, T. L.

TITLE: Heat exchange in a laminar boundary layer flowing round thin plates with internal sources of heat

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, v. 4, no. 5, 1961, 54-61

TEXT: The system of equations describing the present problem (Fig. 1) reads:

$$u\frac{\partial u}{\partial x} + v\frac{\partial u}{\partial y} = \nu\frac{\partial^2 u}{\partial y^2}, \quad \frac{\partial u}{\partial x} + \frac{\partial v}{\partial y} = 0, \qquad (1)$$

The boundary conditions are: $u|_{y=0} = v|_{y=0} = 0$, $u|_{y=\infty} = U$ (2). For the temperature of the liquid one finds $u\partial\Theta/\partial x + v\partial\Theta/\partial y = \chi\partial^2\Theta/\partial y^2$ (3), where a) $\Theta|_{x=0} = 0$ and b) $\Theta|_{y=\infty} = 0$ are the boundary conditions. The equation $\partial^2 t/\partial x^2 + \partial^2 t/\partial y^2 = -Q(x,y)/k_s$ (5) holds for the plate. In these equations, t and Θ denote the temperatures of the plate and the liquid, respectively. The author confines himself to a finite power of the heat

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Heat exchange in a laminar boundary...

sources ($\int_V Q(x,y)dV < \infty$). Under the boundary conditions (2), Eqs. (1) have the well-known exact solutions of H. Blasius (Z. Math. Phys., 56, 1, 1908). By introducing the variable $\eta = (y/2)\sqrt{U/\nu x}$, this system can be reduced to the differential equation $d^3f/d\eta^3 + fd^2f/d\eta^2 = 0$ (13) with the boundary conditions $f(0) = f'(0) = 0$ and $f'(\infty) = 2$. $\psi = \sqrt{\nu U x} f$, where ψ is the stream function. Eq. (13) can be solved either numerically or by expansion in a power series of η. The differential equation (3) is solved on the basis of publications by L. I. Sedov (Metody podobiya i razmernosti v mekhaniki, GITTL, 1957), V. G. Levich (Fiziko-khimicheskaya gidrodinamika, Fizmatgiz, 1959), and Sutton W. (Proc. Roy. Soc., 182, 48, 1943). One obtains

$$\theta(x) = \gamma \int_0^x \frac{p(y)}{(x^{3/4} - y^{3/4})^{1/3}} dy, \quad (24), \text{ where } \gamma = \frac{3a}{4\Gamma(1/3) b \beta^{1/3}},$$

$a = 3/4\Gamma(2/3)\beta^{2/3}$, $b = 3^{5/3}/8\chi x\Gamma(1/3)\beta^{1/3}$. The solution to Eq. (5) reads

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$$\theta(x) = \frac{Q_0}{k_s} x \left(l - \frac{x}{2}\right) \varepsilon(l - x) + \frac{Q_0}{k_s} \frac{l^2}{2} \varepsilon(x - l) -$$

$$- \frac{1}{h} \int_0^{\infty} G(x, y) p(y) dy - \frac{1}{\pi} \int_0^{\infty} \ln \left[\frac{1 - e^{-\pi \frac{x+y}{h}}}{1 - e^{-\pi \frac{|x-y|}{h}}} \right] p(y) dy, \quad (25)$$

where $G(x,y) = \begin{cases} y \text{ for } y < x \\ x \text{ for } y > x \end{cases}$. Thus, the problem is reduced to the solution of the integral equations (24) and (25). The author confines himself to $x/h \gg 1$ and is thus able to simplify Eq. (25) considerably. The expressions obtained for the unknown functions $\theta(x)$ and $p(x)$ are used to determine $\theta(x,y)$ and $t(x,y)$ in quadratures. There are 1 figure and 10 references: 6 Soviet-bloc and 4 non-Soviet-bloc. The most important reference to the English-language publication reads as follows: Chapman D. R., and Rubesin M. W., J. Aeronaut. Sci., 16, 547, 1949.

ASSOCIATION: Institut energetiki AN BSSR, g. Minsk (Institute of Power Engineering, AS BSSR, Minsk)

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PEREL'MAN, T.L.

One boundary value problem for equations of a mixed type in the theory of heat conduction. Inzh.-fiz.zhur. 4 no.8:121-125 Ag '61. (MIRA 14:8)

1. Institut energetiki AN BSSR, Minsk.
(Boundary value problems) (Heat--Conduction)
(Differential equations, Partial)

16.4500

S/044/62/000/008/027/073
C111/C333

AUTHOR: Perel'man, T. L.

TITLE: On the asymptotic solutions for a class of integral equations

PERIODICAL: Referativnyy zhurnal, Matematika, no. 8, 1962, 57-58, abstract 8B259. ("Dokl. An BSSR", 1961, 5, no. 12, 538-540).

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TEXT: A method is described for the equation

$$a(x)\varphi(x) = g(x) + \int_0^\infty k\left(\frac{x}{y}\right) x^\alpha y^\beta \varphi(y)\, dy$$

where $a(x) = \sum_{k=1}^{n} a_k x^{\gamma_k}$, according to which one can obtain the asymptotic solution with large x in a number of cases. The method is based on the Mellin transformation, on the representation of the unknown function $\phi(s+\delta) = \Omega(s)\Psi(s)$ and on the corresponding choice of the factor $\Omega(s)$.

[Abstracter's note: Complete translation.]

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21352
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D299/D304

16.4500 16.6500 16.4100

AUTHOR: Perel'man, T.L. (Moscow)

TITLE: On asymptotic expansion of the solutions of a class of integral equations

PERIODICAL: Prikladnaya matematika i mekhanika, v. 25, no. 6, 1961, 1145 - 1147

TEXT: Various problems of mathematical physics involve the solution of singular integral equations of type

$$a(x)\,\varphi(x) = f(x) + \int_0^\infty k\left(\frac{x}{y}\right) x^\alpha y^\beta \varphi(y)\,dy \qquad (1)$$

4

where

$$a(x) = \sum_k a_k x^{\gamma_k} \quad (a_k = \mathrm{const}). \qquad (2)$$

The asymptotic expansion has the form

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Recursion relations for the coefficients c_n and the constants a and b are found from the equation

$$\sum_k a_k \Omega(s + \gamma_k - \delta)\, \Psi(s + \gamma_k - \delta) = F(s) + G(s)\, \Psi(s + \alpha + \beta - \delta + 1), \tag{7}$$

where

$$G(s) \equiv K(s + \alpha)\, \Omega(s + \alpha + \beta - \delta + 1). \tag{8}$$

Thereupon, the sought-for function $\Phi(x)$ can be readily found by means of Eq. (6). The relation between the functions $\Omega(s)$, $G(s)$ and $\Psi(s)$ is such, that the solution $\Phi(x)$ is uniquely determined. For integral equations met in practice, the function $\Omega(s)$ with the necessary analytical properties, can be readily constructed. It is noted that the above argument can be extended, without substantial modifications, to broader classes of equations than Eq. (1). Thus a(x) may be a linear differenctial operator (i.e. Eq. (1) can be also an integro-differential equation). Also other types of kernels are admissible. As an example, the integral equation

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9.9600 (also 1143, 1482)

AUTHOR: Perel'man, T.L., and Anisimov, S.I.

TITLE: Density Distribution of Charged Particles in Meteor Tracks

PERIODICAL: Doklady Akademii nauk SSSR, 1961, Vol. 136, No. 4, pp. 810-812

TEXT: For the purpose of studying the reflection of radiowaves from meteor tracks it is necessary to know the density distribution of charged particles. By diffusion, recombination, and addition of electrons to neutral atoms and molecules, density changes, the latter effect not changing the density distribution, but the effective recombination coefficient. The relative effect of recombination and diffusion upon the density distribution may be expressed by the dimensionless parameter $\varepsilon = \alpha q/D$, where α is the recombination coefficient , q the number of ionizations per unit length of the meteor track, and D the diffusion coefficient. A differential equation is given, which describes the density of charged particles produced by a meteor moving with uniform speed:

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Density Distribution of Charged Particles in Meteor Tracks

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$$\partial n/\partial t = D\frac{1}{r}\frac{\partial}{\partial r}\left(r\frac{\partial n}{\partial r}\right) - \alpha n^2 + \frac{q}{2\pi v}g\left(\frac{r}{r_0}\right)\delta(z - vt) \qquad (2)$$

$$n(0,t) < \infty \quad , \quad n(\infty,t) = 0 \qquad (3)$$

This differential equation may be calculated by means of the perturbation theory in the case of small ε. With ε being greater, the perturbation theory is not applicable, and an approximation has to be found. The authors discuss the two methods of solution and obtain expressions describing the time dependence of the number of charged particles. They thank Academician Ya.B. Zel'dovich for valuable advice, as well as Member of the AS BSSR M.A. Yel'yashevich, G.L. Barenblatt und Yu.P. Rayzer for discussions. There are 3 references: 2 Soviet and 1 US.

ASSOCIATION: Institut fiziki Akademii nauk BSSR (Institute of Physics, Academy of Sciences BSSR)

PRESENTED: September 1, 1960, by Ya.B. Zel'dovich, Academician

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