24(8) PHASE I BOOK EXPLOITATION SOV/1826

Akademiya nauk SSSR. Energeticheskiy institut

Teploperedacha i teplovoye modelirovaniye (Heat Transfer and Modeling of Heat Processes) Moscow, Izd-vo AN SSSR, 1959. 449 p. Errata slip inserted. 3,500 copies printed.

Resp. Ed.: M. A. Mikheyev, Academician; Ed. of Publishing House: D. A. Ivanova; Tech. Ed.: G. N. Shevchenko.

PURPOSE: The book is intended for scientists concerned with heat transfer, heat emission, and hydraulics of liquid metals, etc.

COVERAGE: This collection is dedicated to the memory of Academician M. V. Kirpichev who in the twenties initiated a systematic investigation of heat transfer processes and the efficiency of heat apparatus. Later he led the development of research work in this field. Two special collections devoted to works of Kirpichev's school have been published, one in 1938, Materialy soveshchaniya po modelirovaniyu (Materials of the Conference on Modeling) and in 1951, Teoriya podobiya i modelirovaniye (Theory of Similitude and Modeling). The present collection prepared in 1956 represents further development of the work of this school. This theory is fundamental for the analysis of many heat problems in the field of electrical and radio engineering. Of great importance are the first systematic investigations of heat transfer and the hydraulics of liquid metals which as a new kind of heat carrier may be used in the various branches of modern engineering. As a result of special investigations of some cases of convective heat transfer, a dependence of the process on the kind of liquid, temperature, pressure, direction of the heat flow, and other factors, was discovered and established. On the basis of a wide generalization of experimental data, new dependable recommendations for heat analysis of engineering equipment were developed. Of no less interest is the work on heat transmission in boiling liquids and the condensation of vapors. All investigations are based on the theory of similitude, the nature of which, according to M. V. Kirpichev, is that of "experimentation." Work on the theory of a regular regime applied to a system of bodies with an internal source of heat is of interest for the future.

Card 2/20

Heat Transfer (Cont.) SOV/1826

Petukhov, B.S. and Ye. [illegible]. Krasnoshchekov. Heat Transfer in a Viscous Flow of Liquid in Conduits Under Conditions of Substantial Change of Viscosity [illegible]

The article describes results of recent investigations of local heat transfer. This problem is especially important in apparatus with relatively short pipes. Current methods of calculating average heat transfer in a flow of viscous liquids are not reliable and up to the present the problem has not been investigated for all practical purposes. L. D. Nol'de assisted the authors in the investigation. There are 9 references: 5 Soviet, 1 English, 2 German, and 1 French.

Petukhov, B. S. and Ye. [illegible]. Krasnoshchekov. Heat Transfer in the Initial Sector of a Pipe in a Mixed Boundary Layer [illegible]

This article discusses problems of viscous flow for larger than critical Reynold's numbers ($R_{cr} < R_e < 10^{5}$) in apparatus with relatively short pipes. In such cases existing formulas for the calculation of heat transfer in viscous (laminar) conditions of flow should not be used. The results of the investigation relate to a case in which natural convection exists in a forced flow of the liquid. There are 5 references: [illegible] Soviet, [illegible] English, and 1 German.

Card 12/20

PETUKHOV, B.S.; ROYZEN, L.I.

Generalized relations for heat transfer during turbulent gas flow in circular tubes. Teplofiz. vys. temp. 2 no.1:78-81 Ja-F '64. (MIRA 17:3)

1. Moskovskiy energeticheskiy institut.

PETUKHOV, B.S., doktor tekhn.nauk; NOL'DE, L.D., kand.tekhn.nauk

Heat exchange during a viscous gravitational flow of a liquid in pipes [with summary in English]. Teploenergetika 6 no.1: 72-80 Ja '59. (MIRA 12:1)

1. Moskovskiy energeticheskiy institut.
(Heat-Transmission) (Fluid dynamics)

24,5200

AUTHOR: Petukhov, B. S., Doctor of [illegible]

TITLE: The Present Condition and the Problems of Development of the Study of Heat Exchange

PERIODICAL: Teploenergetika, 1959, Nr [illegible], pp [illegible] (USSR)

ABSTRACT: The systematic study of heat exchange [illegible] and in the USSR the first systematic investigations of the subject were made by M. V. Kirpichev. The study of heat exchange emerged as an independent science [illegible] 30 years ago and is still developing rapidly. Since the war the work has been intensified to meet the demands of nuclear engineering. Particularly important problems in heat exchange arise in the development of controlled thermo-nuclear reactions. Since the war normal power engineering has also raised many problems in heat exchange. Heat exchange problems are of primary importance in rocket engineering. In view of the prospective rapid development in this science the present article attempts to summarise the main trends in new methods of studying heat exchange and to indicate certain fundamental problems and particular tasks which are of particular importance at the present

Card 1/1[illegible]

The Present Condition and the Prospe[illegible] of [illegible] Study of Heat Exchange

time. The subject of thermal [illegible] reviewed. The mathematic[illegible] conductivity is based on [illegible] equations in partial differential [illegible] parabolic and elliptical types. In [illegible] classical methods of solution [illegible] being made of operational calculus [illegible] of thermal conductivity. [illegible] for the case of several variable[illegible] to two and three-dimensional problems. [illegible] increasing need to calculate temperature fields in machine parts with wide ranges of temperature [illegible] change the physical properties [illegible] problem is particularly complicated [illegible] tion is accompanied by phase conversion [illegible] latent heat. Therefore, one of [illegible] the theory of thermal conductivity [illegible] of general methods of solving non-linear [illegible] partial differential coefficients. In [illegible]

Card /3[illegible]

The Present Condition [illegible] the Prospects [illegible] Development [illegible]
Study of Heat Exchange

approximate solutions are particularly important. Most of such procedures are based on the method of finite differences, the theory and practice of which has achieved considerable development in the Soviet Union. A number of approximate methods have been evolved. The approximate, and particularly numerical, methods are much more universal than the accurate methods but have the disadvantage of involving laborious calculation [illegible] being overcome by the use of computers. In addition to digital computers many of these problems [illegible] to solution by various types of [illegible] [illegible] further use of approximate methods of [illegible] conductivity equations, based on their [illegible] by finite differences, raises problems of computer programming. In thermal conductivity [illegible] involving large heat flows the resistance between surfaces in contact is significant and much work remains to be done on this aspect. The thermal properties of new materials and of old materials in new applications require much more study. There is a particular need

Card 3/13

The Present Condition and the Prospects of Development ... Study of Heat Exchange

to standardize methods ... and although much has ... needs to be extended. F... determining coeffi... solid. ... above, and there ... in this region. Convective ... phase medium is ... exchange and the hydrodynamics ... with laminar flow ... mathematical formulation ... problems, ... difficulties ... many ... problems ... is lacking and a semi-empirical ... has been developed. ... without alteration of the ... Reynolds ... Prandtl and Karman, ... modern semi-empirical theory of heat exchange and friction ...

Card 4/17

4

SOV/[illegible]

The Present Condition and the Prospects of Development [illegible] Study of Heat Exchange

turbulent flow of viscous fluids. This is based on the assumption that the mechanism of heat transfer is identical with that of transfer of momentum, which though generally valid is not always necessarily so. Divergencies between theory and practice that are observed in the case of heat exchange in liquid metals are associated with this circumstance. The Reynolds hypothesis has not been generally verified experimentally, although it cannot always be strictly true. Meanwhile, the semi-empirical theory has to be applied to problems of heat exchange and friction in flows covering a very wide range of Prandtl numbers. Over this range there may be a considerable change in the physical characteristics of both an incompressible fluid and compressible gas. It is evident that progress with the semi-empirical theory of heat exchange in friction depends on experimental investigation of the distribution in the flow of the coefficients of turbulent heat exchange and impulse. Such investigations call for very accurate measurements of temperature and velocity distributions in turbulent flows of heat transfer medium,

Card 5/13

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The Present Condition and the Prospects of Development of the Study of Heat Exchange

which present considerable experimental problems. Work is going on on some aspects of this problem but it is still far from fully solved. Although the semi-empirical theory is the only one that is available now or in the forseeable future it is clearly founded on highly simplified concepts of the mechanism of turbulent exchange. There is clearly a need for a more strict theory of heat exchange and friction in turbulent flow. Engineering solutions are particularly required for high values of Reynolds Number. Methods of the boundary-layer theory are now established and are widely used in practice. Approximate methods for a boundary layer of finite thickness are better developed than those of an asymptotic boundary layer, and the latter method needs further attention. An important application of the theory of the boundary layer is in heat exchange and friction calculations at very high temperatures above 2500°K, such as arise during motion of a body in the atmosphere at high supersonic speeds. Exothermic

Card 6/13

4

The Present Condition and the Prospects of Development of the Study of Heat Exchange

or endothermic chemical reactions may occur at these temperatures and this complicates the problem. At still higher temperatures, of the order of 10000°K, ionisation of the gas may occur so that it becomes electrically conducting and subject to the influence of a magnetic field. In this case, motion of the gas is described by the equations of magneto-hydrodynamics. The application of boundary-layer theory and study of convective heat exchange in these conditions is a pressing problem. Experimental methods play a predominant part in the study of heat exchange and indeed many problems can only be tackled in this way. The theory of similarity thus assumes importance, and approximate semi-empirical methods of studying problems of this kind have considerable practical value. A number of particular problems of convective heat exchange in a single-phase medium are then mentioned, commencing with those of heat exchange and resistance when the physical properties of the heat transfer medium are variable. A good deal of work has been done on specific problems of this kind but there

Card 7/13

The Present Condition and the Prospects of Development of ... of Heat Exchange

is a need to unify ... with the problem as a whole ... contemporary requirements. Problems ... of liquid metal heat-transfer media ... good deal of the work that has been done ... metals relates to round pipes; there is a practical need for heat-exchange data in pipes with other shapes of section, such as oval or rectangular. Study of heat transfer with liquid metals ... of low values of Reynolds number with laminar and transitional flow conditions. Convection heat-transfer and resistance problems arise during the motion of bodies in a ... medium at high speeds. These and other matters concerning the turbulent flow of a compressible gas need theoretical and experimental study. Special interest ... the study of heat exchange and resistance in cylindrical and axially symmetrical bodies in the presence of considerable pressure-gradients. The transition from laminar to turbulent flow should be studied ... high Mach numbers. Special effects ... at ...

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The Present Condition and the Prospects of Development of the Theory of Heat Exchange

of 10 and above, at which surface temperatures may be very high, and if chemical reactions occur simultaneously, close investigation is needed. Flights at high altitudes and in space pose the special problem of heat exchange and resistance during high-speed motion in a rarefied gas. Distinctive problems also arise in high vacua because of the presence of a free molecular path. A number of investigators have applied modern molecular-kinetic theory to this subject and analytic solutions have been obtained for heat transfer and resistance of plates, cylinders and spheres under these conditions. The intermediate region of somewhat higher pressures present greater theoretical difficulties and only very approximate theoretical results have been achieved. Little experimental data is available for either of these regions and work should accordingly be carried out at high Mach values over a range of low pressures. Heat exchange during boiling and condensation is then considered. Little work has been done on the theory of boiling; however American contributions to

Card 9/13

The Present Condition and the Prospects of Development of the Study of Heat Exchange

this subject are briefly reviewed. In order to be able to develop the theory, further experimental evidence is required about the mechanism of boiling. Earlier work concentrated mainly on boiling during conditions of natural convection, and the majority of the work has been concerned with the determination of heat-transfer coefficients and critical thermal loadings. Recent work has been more concerned with heat transfer during boiling of liquids undergoing forced flow in pipes. A great deal of attention has already been given to boiling during free flow However, the general formulae derived previously do not accommodate recent experimental data on certain liquids. Therefore, new formulae with a better basis in physics are required for this case. There is a need to generalise experimental data of heat exchange during boiling in pipes at temperatures up to the saturation temperature. Further experimental data are required on heat transfer, critical loadings and hydraulic resistance over a wide range of steam content with simultaneous operation of other parameters over a

Card 10/17

wide range. Data are needed for other fluids besides water. American work on boiling when heat is evolved within the volume of the heat transfer medium is reviewed. Most available theoretical work on film-wise condensation has been concerned with extending Nusselt's theory for laminar flow, and the theory of this subject is now fairly complete. Whilst a good deal of attention has been given to film-wise condensation of steam moving at low speed, much less has been done at higher film speeds. There is a need for improved design formulae for this case. Ideas are accumulating about the physics of drop-wise condensation but satisfactory methods of making theoretical calculations on this subject are not yet available. Further information is required about condensation of steam from a steam/gas mixture. This work could be extended to mixtures of various vapours and gases in containers of different proportions. Further work is required on heat exchange during boiling and condensation of mixtures and solutions. Radiant heat-exchange is then considered. A general review is given of the [illegible] of strict [illegible] methods is

ANTSYFEROV, M.S., kand.fiz.-mat.nauk; VUKALOVICH, M.P., prof., doktor tekhn.nauk, laureat Leninskoy premii; KRIPETS, B.S., inzh.; LAZAREV, L.P., prof., doktor tekhn.nauk; MAZYRIN, I.V., inzh.; NIKITIN, N.N., kand.fiz.-mat.nauk; OCHKIN, A.V., inzh.; PANICHKIN, I.A., prof., doktor tekhn.nauk; PETUKHOV, B.S., prof., doktor tekhn.nauk; PODVIDZ, L.G., kand.tekhn.nauk; SIMONOV, A.F., inzh.; SHIRYAGIN, A.P., kand.tekhn.nauk; TOKMAKOV, G.A., kand.tekhn.nauk; FAYNZIL'BER, B.M., prof., doktor tekhn.nauk; KHALIZEV, G.P., kand. tekhn.nauk; CHERSACHENKO, V.F., kand.tekhn.nauk; YAN'SHIN, B.I., kand.tekhn.nauk; ACHERKAN, N.S., prof., doktor tekhn.nauk, red.; KUDRYAVTSEV, V.N., prof., doktor tekhn.nauk, red.; PONOMAREV, S.D., prof., doktor tekhn.nauk, laureat Leninskoy premii, red.; SATEL', E.A., prof., doktor tekhn.nauk, red.; SERENSEN, S.V., akademik, red.; RESHETOV, D.N., prof., doktor tekhn.nauk, red.; KARGANOV, V.G., inzh., red.graficheskikh materialov; GIL'DENBERG, M.I., red.izd-va; SOKOLOVA, T.F., tekhn.red.

[Manual of a mechanical engineer in six volumes] Spravochnik mashinostroitelia v shesti tomakh. Red.sovet N.S.Acherkan i dr. Izd.3., ispr. i dop. Moskva, Gos.nauchno-tekhn.izd-vo mashinostroit.lit-ry. Vol.2. 1960. 740 p. (MIRA 14:1)

1. AN USSR (for Serensen).
(Mechanical engineering) (Machinery--Construction)

69142

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E194/E255

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AUTHORS: Petukhov, B. S., Doctor of Technical Sciences and
Kirillov, V. V., Candidate of Technical Sciences

TITLE: Heat Exchange During Turbulent Flow of a Compressible Gas in Pipes in the Region of Mach Number up to 4

PERIODICAL: Teploenergetika, 1960, Nr 5, pp 64-73 (USSR)

ABSTRACT: Because of developments in high-speed aircraft and in gas turbines, the question of heat exchange during high-speed gas flow is acquiring considerable practical importance. Most of the theoretical work that has been done on heat exchange and resistance during turbulent flow of a compressible gas relates only to the single case of a flat sheet in a longitudinal flow of gas. Heat exchange and resistance in pipes and nozzles has received much less study. The least study has been devoted to heat exchange and resistance conditions during the flow of a compressible gas in pipes, though experimental work has been done on this subject in the USSR and in the USA. The influence of gas compressibility on heat exchange during flow in pipes is still obscure, and the present article describes experimental work on the subject.

Card 1/8

69142

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E194/E255

Heat Exchange During Turbulent Flow of a Compressible Gas in Pipes in the Region of Mach Number up to 4

Preliminary results of this work have already been published. The experimental equipment and procedure is first described. The thick-walled pipe method was used, because it permits very accurate measurement of local heat flows during heating or cooling of fluid in a pipe. The method is based on determination of local heat flow from measurements of the temperature distribution on the inside and outside surfaces of the experimental pipes. In the general case, the temperature field in the pipe wall is two-dimensional, and equations for heat-flow density are of complex form. However, if changes in axial heat-flow are neglected, the problem is much simplified and the local heat flow is given by Eq (1). The tests were made with air delivered from a compressor which could give a flow of up to 900 kg/hour at a pressure of 7 atm. The air was cleaned and dried. The experimental pipe is illustrated diagrammatically in Fig 1. Its internal diameter of 15.95 mm was chosen to give the maximum value of Reynolds number for the available rate of air flow and retardation pressure.

Card 2/8

69142

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E194/E255

Heat Exchange During Turbulent Flow of a Compressible Gas in Pipes in the Region of Mach Number up to 4

The pipe was made of steel grade 1Kh18N9T which has a low coefficient of thermal conductivity; special attention was paid to the internal finish. Arrangements were made to measure the temperature with thermo-couples. Seven different nozzles could be used, giving one subsonic and six supersonic speeds corresponding to Mach numbers of 2, 2.5 (two nozzles), 3, 3.5 and 4. Air cooling tests were made. In working out the test results, the flow velocity and temperature were determined on the assumption of unidimensional flow. The local heat-transfer coefficient is given by expression (2). For supersonic flow, the restoration factor is given by expression (4), which represents the experimental results with an accuracy of ± 1%. During the investigations, 83 tests were made consisting of seven series, each for a definite Mach number at the inlet to the tube. Some of the tests were made with artificial turbulation of the boundary layer. The tests cover the Mach number range from 0.5 to 4 and Reynolds numbers

Card 3/8

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E194/E255

Heat Exchange During Turbulent Flow of a Compressible Gas in Pipes in the Region of Mach Number up to 4

from 40000 to 900000. The retardation temperature and the wall temperature were approximately constant and equal to 420°K and 300°K. The flow temperature ranged from 400 to 100°K. Graphs showing the change of heat transfer over the length of the pipe are shown in Fig 4. They indicate that at the start of the pipe there is a region of laminar flow and a transitional boundary layer. As the Reynolds number increases the size of this section diminishes. The first graph of Fig 2 shows that heat transfer in the transitional region depends considerably on the degree of turbulence of flow at the inlet to the tube. Analysis of the process of heat exchange during the flow of a compressible gas in pipes based on the theory of similarity shows that under these conditions heat exchange depends on five criteria, as in expression (5). It is then shown how the influence of the gas compressibility on heat exchange may be determined, using expression (6). The curve corresponding to this formula is plotted in Fig 3a, and it will be seen that most of the experimental points lie within

Card 4/8

Card 5/8 indicate that the experimental points lie closely around a

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E194/E255

Heat Exchange During Turbulent Flow of a Compressible Gas in Pipes in the Region of Mach Number up to 4

line given by expression (10). Comparison of formulae (10) and (7) shows that in both the relationship between the heat transfer and the Reynolds number is the same, though at Mach 0 formula (10) gives results about 7% lower than formula (7). It is concluded that for the case of flow in pipes the method of governing temperature may be used to allow for the influence of gas compressibility on heat exchange. In the tests described, heat transfer was measured in a comparatively short tube; during flow in short tubes, much of the tube is occupied by the so-called initial section in which the distributions of velocity and temperature are set up. Strictly speaking the influence of the walls extends to the entire section of the tube, but at the beginning of the tube there is only appreciable disturbance of flow in a thin layer near the walls, which increases in thickness as the distance from the inlet increases. In order to study the relationship between the heat transfer during flow in pipes and with external flow over a plate, the experimental data were worked out in the form of the so-called

Card 6/8

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Heat Exchange During Turbulent Flow of a Compressible Gas in Pipes in the Region of Mach Number up to 4

two-dimensional model of flow. According to this, the flow in the initial section of the tube is sub-divided into a boundary layer and an iso-entropic core. It is assumed that the retardation temperature and pressure in the core are constant. On this basis, expression (12) is derived and is valid for Reynolds numbers from 40×10^3 to 30×10^6. The relationship between heat transfer and Reynolds number in this case is plotted in Fig 6; the scatter of experimental points is approximately the same as in the single-dimensional case. Formula (12) for heat transfer in the initial section of the tube was compared with the published formula for heat transfer from a flat sheet in the subsonic region of air flow. It is found that the relationship between heat transfer and the Reynolds number is approximately the same in the two cases, though heat transfer is a bit less in the tubes than on the sheet. The results of the comparison, plotted in Fig 7, show the experimental data to be in good

Card 7/8

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E194/E135

AUTHORS: Petukhov, B.S., Shlykov, Yu.P., Kurayeva, I.V., Kazakova, Ye.D., and Prozorov, V.K.

TITLE: Calculation of Transient Temperature Fields in Multi-Layer Walls with Internal Heat Evolution by the Hydrothermal Analogy Method

PERIODICAL: Teploenergetika, 1960, No 10, p 95

TEXT: The temperature distribution is calculated in two and three layer walls with internal sources of heat, required to determine the temperature gradients during calculation of the strength of assemblies in several types of heat exchange equipment. 21

ASSOCIATION: Moskovskiy energeticheskiy institut (Moscow Power Institute)

Card 1/1

PETUKHOV, B.S.; ROYZEN, L.I.

Experimental study of heat transfer during turbulent gas flow in circular tubes. Teplofiz. vys. temp. 1 no.3:416-424 N-D '63. (MIRA 17:3)

1. Moskovskiy energeticheskiy institut.

[illegible]TURKOV, E. [illegible]

Theoretical calculation [illegible] heat transfer and [illegible] resistance in turbulent flow of equilibrium dissociating hydrogen. Teplofiz. vys. temp. 2 no.4:509-611 [illegible]

[illegible]

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001240710002-4"

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AUTHORS: Petukhov, B. S., Genin, L. G., Mal'ter, V. L.

TITLE: Heat Exchange in Tubes in the Presence of Inner Heat Sources in the Liquid Flow

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, 1960, Vol. 3, No. 9, pp. 3-9

TEXT: The authors start from the differential equation (1) which describes the steady flow of a liquid with uniformly distributed inner heat sources and a constant density of heat flow on the tube walls. They obtain formula (4) for the temperature distribution of a laminar flow. The lines calculated by (4) are graphically shown in Fig. 1. The authors also found the heat exchange coefficients to be proportional to the difference $t_w - t_{at}$. Here, t_w denotes the wall temperature when the tube is traversed by a liquid with inner heat sources, and t_{at} is the adiabatic wall temperature, i.e., the wall temperature at which there is no heat exchange between wall and surrounding medium. Based on results and data by

Card 1/2

PETUKHOV, B. S.

"Heat Transfer and Hydraulic Resistance at Turbulent Flow of a Liquid with Variable Physical Properties in Tubes."

Report submitted for the Conference on Heat and Mass Transfer, Minsk, BSSR, June 1961.

PETUKHOV, B. S.

"Heat-exchange and hydraulic resistance in the turbulent cour e of a liquid with varying physical pr perties flowin through a tube."

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

PETUKHOV, B.S.; RUDAKOV, Yu.P.

Units for checking technological processes in preparing abrasive materials. Mashinostroitel' no.2:18 F '61. (MIRA 14:2)
(Abrasives) (Electric controllers)

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AUTHORS: Petukhov, B. S., Tsvetkov, F. F.

TITLE: Calculation of heat exchange in laminar liquid flow in tubes within the range of low Péclet numbers

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, v. 4, no. 3, 1961, 10-17

TEXT: The authors used an approximation method in calculating the heat exchange in a laminar flow of liquid within the range of low Pe numbers. This method is base on a stepped, instead of a continuous, radial temperature variation with the longitudinal temperature distribution remaining continuous. During these studies on stabilized flow and heat exchange in a cylindrical tube it is assumed that the liquid is not compressed, that its physical parameters are constant, that frictional heat is but little, and that the flow is hydrodynamically stabilized. The tube is divided along its radius into a number of coaxial layers whose thickness δ_1 may differ in any general case. The wall of the tube is counted as one of those layers. By dividing the tube into n layers and establishing a heat balance equation for each of these layers one obtains n ordinary second-order differential

Card 1/

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Calculation of heat ...

equations which take the boundary conditions at the wall into consideration. The solution of these equations yields the temperature variation as depending on x accurate except for a constant, for each of these layers. The integration constants are determined from the boundary conditions at the inflow and at the outflow end of the tube (or in infinity). After the equations for the temperature field have been found it is easy to calculate the local heat exchange coefficient. For a more exact calculation of the integral, the temperature distribution is approximated by a discontinuous line. The suggested method is the more effective, the smaller the number of layers securing an accurate computation. Comparison of the results obtained by this method with the accurately computed values of heat exchange in laminar flow through tubes, known from competent publications, showed that on division of the tube into three layers the error amount to 3% at most, and to 1% in the case of four layers. The suggested method was used in solving the problem of heat exchange in a laminar flow of liquid through a round tube with constant heat flux density at the wall (the wall was assumed to be infinitely thin). Formulas were derived for the temperature field (i' a)

Card 2/8

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Calculation of heat ...

$\theta_i = 4X + \sum_{j=1}^{3} A_{ij} \exp(-\varepsilon_j X) + A_{i4}$ (X>0) and (11.b) $\theta_i = 4\sum_{j=1}^{4} B_{ij} \exp(\alpha_j X)$ (X<0), Fig. 1, for the mean calorimetric temperature of the liquid (12 a)

$\theta_{liq} = 4X + \sum_{j=1}^{3} C_j \exp(-\varepsilon_j X) + C_4$ (X>0) and (12.b) $\theta_{liq} = \sum_{j=1}^{4} D_j \exp(\alpha_j X)$ (X<0)

(Fig. 2), and for the local Nusselt number (13) $1/Nu = \sum_{j=1}^{3} E_j \exp(-\varepsilon_j X) + E_4$

(Fig. 3). Here, A_{ij}, B_{ij}, C_j, E_j, ε_j and α_j denote constants depending on the Pe number the values of which are given in Table 1. It was shown that the temperature gradient at the wall, in accordance with the boundary conditions, remains constant for X>0 and vanishes at X<0. The $\theta_{liq} = F(X)$ curves are located the higher, the lower the Pe number. The effect of axial heat conductivity becomes conspicuous for the fact that, first, at low X values the Nu number rises with Pe and that, secondly, the reduced length of the thermal initial section $[(1/Pe)(l_{t.A.}/d)]$ decreases with rising Pe, tending

X

Card 3/8

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B117/B209

Calculation of heat ...

towards a limit of 0 07; the relative length of the thermal initial section increases thereon. In Fig. 4 the theoretical value of the Nusselt number $Nu_\infty = 4.36$ is compared with the experimental data with respect to the heat exchange during the flow of mercury in a round tube, and it shows satisfactory agreement. These data were ascertained at the Moskovskiy energeticheskiy institut (Moscow Power Engineering Institute) by A. Ya. Yushin, A. S. Sukomel, and B. K. Strigin under the supervision of one of the authors. There are 4 figures, 2 tables, and 5 references: 2 Soviet-bloc.

ASSOCIATION: Energeticneskiy institut, g Moskva (Institute of Power Engineering, Moscow)

SUBMITTED: December 12, 1960

Card 4/8

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S/020/61/136/006/0??/024
B104/B204

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AUTHORS: Petukhov, B. S. and Yushin, A. Ya.

TITLE: Heat exchange in the flow of a liquid metal in laminar and intermediate regions

PERIODICAL: Doklady Akademii nauk SSSR, v. 136, no. 6, 1961, 13??-1334

TEXT: By means of the experimental arrangement shown in Fig. 1, the heat exchange was studied on mercury with hydrodynamic and thermal stabilization of the flow. During filling, mercury was purified by distillation, and the two containers were filled with argon from which oxygen had been removed. The heat transfer coefficient was calculated from the relation $\alpha = q_l/\pi d\Delta t$, where q_l is the density of the heat flow (kcal/m.hr) per unit length of the test tube; d is the inner diameter of the tube; $\Delta t = t_w - t_{liq}$, where t_w is the wall temperature and t_{liq} the liquid temperature in a certain cross section. A correction of the relation, from which t_{liq} is calculated, is discussed, which takes heat

Card 1/4

20634
S/020/61/136/006/010/024
B104/B204

Heat exchange in the flow of a ...

transfer through the mercury and the tube in the longitudinal direction into account. For the purpose of further reducing the effects produced by heat transfer in the longitudinal direction, the heat transfer coefficients were determined in cross sections which were at a distance of 18 d and 43 d from the beginning of the heated section of the tube. Thus, the numbers determined here are limits, i.e., they are minimum values. Tests with turbulent water showed satisfactory results. The experiments with mercury were carried out in the following ranges: Pe from 14 to 600, Re from 620 to 23,500 (Pr = 0.021 ÷ 0.026). In Fig. 2, the Nu number is graphically represented as a function of the Pe number. As may be seen, Nu = 4.36 for the laminar region, and Nu = = 4.36 + 0.0053 Pe for the intermediate region. It is further noted that the results obtained here agree with an accuracy of ±5% with the formula $Nu = 5 + 0.014\,Pe^{0.8}$ with Pe > 400 (Re > 1600) developed by the Energeticheskiy institut AN SSSR (Institute of Power Engineering of the AS USSR). It may further be seen that at the critical Reynolds number Re_{cr} = 2300 no considerable change of the dependence of the Nu number upon the Pe number occurs. Finally, the effect of cross grooves in the

Card 2/5

20634

Heat exchange in the flow of a ...

S/020/61/136/006/010/024
B104/B204

tube upon the heat transfer is investigated. It is found that as a result of these cross grooves, considerable irregularities in the distribution of q_1 over the experimental length of the tube occur, and that the use of cross grooves is not convenient at small Pe numbers, because this may cause considerable errors. M. V. Vol'kenshteyn, M. A. Yel'yashevich, B. I. Stepanov, L. S. Mayants, L. A. Ignat'yev, and I. K. Bayev are mentioned. There are 3 figures and 5 references: 3 Soviet-bloc and 2 non-Soviet-bloc.

ASSOCIATION: Moskovskiy energeticheskiy institut (Moscow Institute of Power Engineering)

PRESENTED: September 14, 1960, by P. L. Kapitsa, Academician

SUBMITTED: August 24, 1960

Card 3/5

S/096/62/000/005/007/009
E194/E454

AUTHORS: Petukhov, B.S., Doctor of Technical Sciences, Professor
Kovalev, Engineer

TITLE: A procedure and certain results of measurement of critical loads on transition from filmwise to bubble boiling

PERIODICAL: Teploenergetika, no.5, 1962, 65-70

TEXT: This article analyses available methods of making tests or the critical condition of change from film boiling with evolution of bubbles and suggests a new one. Accurate knowledge is required to ensure stable operation of modern boilers and atomic reactors in which film boiling is possible. Experimental results obtained by the usual electrical heating methods are unreliable. Accordingly, special tests were made using distilled water at atmospheric pressure under conditions of free convection. The heating surfaces were horizontal electrically heated tubes and wires. Film boiling was ensured by preliminary heating of the specimens in the vapour phase. Special care was taken to ensure uniformity of heating over the length of the specimen:

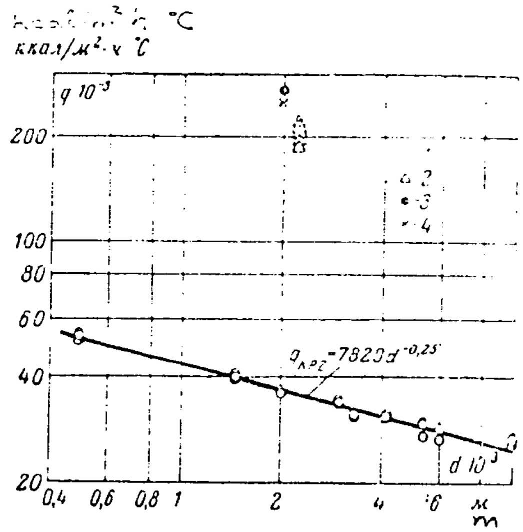
Card 1/3

equations are derived for this temperature distribution. The experimental equipment with electrically heated specimens is described. Specimens heated to a temperature of 350 to 400°C were immersed in boiling water and the current through them was gradually reduced until the second critical point was reached, when the film broke away from the specimen. The experimental results are plotted in Fig.3 as loading in kcal/m^2 hr °C against specimen diameter in mm; the points on the graph are denoted as follows: 1 - experimental results for second critical heat loading; 2 - results of M.V.Borishanskiy's article in the Symposium "Problems of Heat Exchange on Altering the Aggregate condition of Substance", Gosenergoizdat, 1953; 3 - experimental equilibrium loading; 4 - calculated equilibrium loading. The results show that increasing the specimen diameter reduces the second critical heat loading and that the material of which the specimen is made has little effect on the results. It is shown how to use the test results to calculate the loading at which there is equilibrium between bubble- and film-boiling. There are 4 figures and 1 table.

A procedure and certain results ... S/096/62/000/005/007/009
E194/E454

ASSOCIATION: Moskovskiy energeticheskiy institut
(Moscow Power Engineering Institute)

Fig.3.



Card 3/3

EWT(1)/EWP(m)/ETC(F)/EPF(n)-2/EWG(m)/EWA(d)/FCS(k)/EWA(1) WW/GS

L 11857-66

ACC NR: AT6001354 SOURCE CODE: UR/0000/65/000/000/0066/0075

AUTHOR: Petukhov, B. S.; Royzen, L. I.

ORG: Moscow Power Institute (Moskovskiy energeticheskiy institut); AllOUnion Electrotechnical Institute im. V. I. Lenin (Vsesoyuznyy elektrotekhnicheskiy institut)

TITLE: Heat transfer in the flow of a gas in tubes with an annular cross section

SOURCE: Teplo- i massoperenos. t. 1: Konvektivnyy teploobmen v odnorodnoy srede (Heat and mass transfer. v. 1: Convective heat exchange in an homogeneous medium). Minsk, Nauka i tekhnika, 1965, 66-75

TOPIC TAGS: convective heat transfer, gas flow, thermodynamics

ABSTRACT: The article gives the results of an experimental investigation of heat transfer in the turbulent flow of air in annular tubes over a range of variation of the geometric parameter d_1/d_2 from 0.07 to 0.84. The experimental apparatus (shown in a diagram) consists of two concentric tubes. A table gives the geometric characteristics of the channels. The outer brass tube (wall thickness 0.003 meters) was heated with an electric heater. The inner tube, made of 1Kh18N9T, was suspended at a single point by a wire with a thickness of 0.001 meters. The air was

Card 1/2

L 11857-66

ACC NR: AT6001354

fed into the channel from a high-pressure blower. All measurements were made at an established steady thermal stat of the system. The temperature of the walls and the temperature drop between the walls and the liquid were maintained approximately constant during the course of the experiments. Based on the experimental results, calculations were made of the density of the heat flux due to convection at the outer and inner wall of the tube. Equations are derived for calculation of the heat transfer and the adiabatic temperatures of the walls with unilateral heating (either inside or outside). Orig. art. has: 12 formulas, 5 figures, and 1 table.

SUB CODE: 20/ SUBM DATE: 31Aug65/ ORIG REF: 005/ OTH REF: 008

HW

Card 2/2

L 21825-66 EWT(1)/EWP(m)/EPF(n)-2/EWG(m)/EWA(d)/ETC(m)/EWA(1)/ETC/FCS WW/GS

ACC NR: AT6001363 SOURCE CODE: UR/0000/65/000/000/0172/0182

AUTHOR: Petukhov, B. S.; Cheng, Cheng-yung

ORG: Moscow Power Institute (Moscovskiy energeticheskiy institut)

TITLE: Heat transfer in a hydrodynamic inlet section of a round tube with laminar flow of a fluid

SOURCE: Teplo- i massoperenos. t. 1: Konvektivnyy teploobmen v odnorodnoy srede (Heat and mass transfer. v. 1: Convective heat exchange in an homogeneous medium). Minsk, Nauka i tekhnika, 1965, 172-182

TOPIC TAGS: convective heat transfer, hydrodynamics, metal tubes, fluid flow, Nusselt number

ABSTRACT: The problem of heat transfer in the hydrodynamic inlet section of a round tube when the heat flux at the wall is constant is solved with the following assumptions: 1) the flow and heat transfer are steady-state; 2) the fluid is incompressible and its physical properties are constant; 3) the change in the heat flux due to heat conductivity along the axis and the heat of friction are negligibly small; 4) the temperature and velocity of the fluid in the inlet section are uniformly distributed and the velocity vector coincides with the axis of

L 11829-65

ACC NR: AT6001363

the tube; and, 5) the density of the heat flux remains constant at the inner surface of the tube wall. The article shows a curve of the Nusselt number in the inlet section of a round tube as a function of the velocity profile along the length of the tube, and a second curve shows a comparison of the values of the Nusselt number according to the calculations of the authors and the calculations of other authors. Finally, the article arrives at an interpolation formula for calculation of the Nusselt number at the wall:

$$Nu_w = 1.31\left(\frac{1}{Pe}\frac{x}{d}\right)^{-1/3}\left(1+2\frac{1}{Pe}\frac{x}{d}\right). \qquad (17)$$

This equation is said to describe the authors' calculations for a parabolic velocity profile with an accuracy of ± 4%, and is valid for values of

$$\frac{1}{Pe}\frac{x}{d} < 0{,}033.$$

Orig. art. has: 18 formulas and 3 figures.

Card 2/2

L 33667-66 EWT(1)/EWP(m) WW

ACC NR: AP6014068 SOURCE CODE: UR/0294/66/004/002/0228/0232

AUTHOR: Petukhov, B. S.; Mukhin, V. A.

ORG: Moscow Power Institute (Moskovskiy energeticheskiy institut)

TITLE: Experimental investigation of heat transfer during the supersonic flow of a gas in a round tube

SOURCE: Teplofizika vysokikh temperatur, v. 4, no. 2, 1966, 228-232

TOPIC TAGS: convective heat transfer, supersonic flow, gas flow

ABSTRACT: The working section of the experimental apparatus was a brass tube with an inside diameter of 20.2 mm, and outer diameter of 87 mm, and a length of 575 mm. The tube was water cooled. The local density of the heat flux was determined from the temperature drops in the walls of the tube. Air, previously cleaned of oil, moisture, and dust, was heated in an electric furnace to a temperature of from 200 to 800°C and was introduced into the working chamber through replaceable nozzles. Five series of experiments were made, with Mach numbers at the inlet of the tube of $<$ 1, 2.5, 3.0, 3.5, and 4. The change in pressure and velocity along the length of the tube in subsonic and supersonic flow corresponded in general to the one dimensional theory. Based on the

Card 1/2 UDC: 536.242:533.6.011.35

L 33667-66

ACC NR: AP6014068

experimental data the article derives the following two empirical relationships:

$$\mathrm{St} = 0{,}031\,\mathrm{Re}_x^{-0{,}2}\,\mathrm{Pr}^{-0{,}5}\,\mathrm{T}^{0{,}47}, \qquad (6)$$

$$\mathrm{St} = 0{,}013\,\mathrm{Pe}_{\mathrm{T}}^{**\,-0{,}25}\,\mathrm{Pr}^{-0{,}5}\,\mathrm{T}^{0{,}02}, \qquad (7)$$

где $P_{\mathrm{T}}^{**} = \int_0^x q_c\,dx \,/\, \lambda(t_{a.c} - t_c)$

These equations are said to agree satisfactorily with experimental data on heat transfer in the initial section of a tube, and for flow around a body, under conditions of cooling at Mach numbers $M \leqslant 7$. Orig. art. has: 7 formulas and 4 figures.

SUB CODE: 20/ SUBM DATE: 15May65/ ORIG REF: 007/ OTH REF: 007

Card 2/2 mc

ACC NR: AP6029778 SOURCE CODE: UR/0294/66/004/004/0531/0539

AUTHOR: Popov, V. N.; Petukhov, B. S.

ORG: Moscow Power Engineering Institute (Moskovskiy energeticheskiy institut)

TITLE: Theoretical calculation of heat transfer and resistance in laminar pipe flow of hydrogen dissociated in equilibrium

SOURCE: Teplofizika vysokikh temperatur, v. 4, no. 4, 1966, 531-539

TOPIC TAGS: heat exchanger, hydrogen, ~~propulsion~~ laminar flow, pipe flow

ABSTRACT: In high-temperature heat exchangers, the viscosity of the gas becomes so high that a laminar flow regime is frequently established. Therefore, a theoretical study was made of the local heat transfer coefficients and the flow resistance during laminar pipe flow of dissociated hydrogen. The heat flux through the wall was assumed to be constant. The results calculated for pressures of 1, 10, and 100 atm at 2000—5000K are presented in graphs. Orig. art. has: 5 formulas and 8 figures. [FV]

SUB CODE: 21/ SUBM DATE: 27Oct65/ ORIG REF: 002/ OTH REF: 003 ATD Press 5065

Card 1/1 UDC: 536.24.01.532.542.2

L 45629-65 EWT(1)/EWP(m)/EWT(m)/EWA(d)/EWP(t)/EWP(z)/FCS(k)/EWP(b)/EWA(1) Pd-1
JD

ACCESSION NR: AP5006473 S/0294/65/003/001/0102/0108

AUTHOR: Petukhov, B. S.; Kirillov, V. V.; Chu, Tzu-hsiang; Maydanik, V. N.

TITLE: Experimental investigation of the effect of the temperature factor on heat exchange in turbulent flow of gas in tubes

SOURCE: Teplofizika vysokikh temperatur, v. 3, no. 1, 1965, 102-108

TOPIC TAGS: temperature factor, heat exchange, turbulent flow, Reynolds number, Nusselt number, heat transfer

ABSTRACT: This is part of a systematic investigation carried out for several years at NIIVT (Scientific Research Institute of High Temperatures) on heat exchange under conditions of appreciable variation of physical properties of flowing liquid. The purpose of the present investigation was to extend the range of previous investigations of local heat transfer and turbulent flow of gas in tubes at high temperature gradients, and to accumulate experimental data on the subject. An earlier stage of the research was lteady published (Teplofizika vysokikh temperatur v. 1, no. 1, 1963). The experiments were made with nitrogen in a stainless steel tube heated with electric current flowing through the tube wall. The

L 45629-65

ACCESSION NR: AP5006473

experimental set-up was designed with particular attention to elimination of heat losses. A detailed description of the equipment is included. Some 60 experiments were made and 300 experimental points obtained. The Reynolds numbers ranged from 2×10^4 to 2×10^5. The temperature factor was varied between 1.1 and 3.6, with the inlet gas temperature ranging from 100 to 500K. The wall temperature reached 1500K. Heat balance was maintained within 5%. The results show that the variation of the gas temperature at the inlet to the tube does not exert any noticeable influence on the heat transfer even at large values of the temperature factor, and that the influence of the temperature factor on the heat transfer varies noticeably over the length of the tube. The experimental data fit the heat transfer formula $Nu = 0.022 \cdot Re^{0.8} \cdot Pr^{0.4}$, which is in good agreement with earlier results and with calculations by the authors (Teploenergetika no. 4, 1958). Orig. art. has: 5 figures and 3 formulas.

ASSOCIATION: Moskovskiy energeticheskiy institut (Moscow Power Engineering Institute)

SUBMITTED: 23Jul64 ENCL: 00 SUB CODE: TD, ME

NR REF SOV: 007 OTHER: 006

Card 2/2

L 8652-65 EWT(1)/EWP(m)/EWT(m)/EPF(c)/EPF(n)-2/EPR/T/EPA(bb)-2/FCS(k)/EWP(b)/EWA(1) Pd-4/Pr-4/Ps-4/Pu-4 AFTC(a)/ASD(d)/ASD(p)-3/AS(mp)-2/ASD(f)-2/BSD/AEDC(a)/SSD/ESD(t) JD/WW/JW

ACCESSION NR: AP4044527 S/0294/64/002/004/0599/0611

AUTHOR: Petukhov, B. S.; Popov, V. N.

TITLE: Theoretical calculation of heat transfer and friction resistance in a turbulent flow in a pipe of equilibrium dissociating hydrogen

SOURCE: Teplofizika vy*sokikh temperatur, v. 2, no. 4, 1964, 599-611

TOPIC TAGS: heat transfer, dissociation, turbulent flow, hydrogen dissociation, hydrogen oxygen mixture, equilibrium dissociation

ABSTRACT: A method is given for theoretical calculation of heat transfer and friction resistance in a turbulent flow of dissociating hydrogen in a pipe. It is assumed that the dissociation rate exceeds considerably the convective and diffusional mass transfer rates. In this case, chemical equilibrium is established in each point of the flow, and the composition of the mixture is a function of pressure and temperature only. In the case of equilibrium dissociation, the concentration profile in the flow may thus be defined without solving the diffusion equation. The heat transfer, friction resistance, and different

Card 1/3

L 8652-65
ACCESSION NR: AP4044527

physical properties (specific enthalpy, specific heat, thermal conductivity, density, dynamic viscosity, and Prandtl number) were calculated at 1, 10, and 100 atm and 2000—5000K. Dissociation results in unique changes of physical properties as a function of pressure and temperature. The specific heat and the thermal conductivity change markedly with temperature and exhibit maxima. Fig. 1 of the Enclosure shows that owing to changes in physical properties caused by dissociation the heat transfer may change by 400%. Comparison of Fig. 1a and 1b shows that when the correction $c_{p}c/c_{p}$ (c_p, specific heat at variable physical properties; c_p, average specific heat) is used, scattering of the data can be reduced from 380% to 30%. This signifies that the heat transfer is basically influenced by changes in the specific heat, and the effect of changes in viscosity and density on heat transfer does not exceed 30%. Orig. art. has: 40 formulas and 5 figures.

ASSOCIATION: none

SUBMITTED: 15May64 ATD PRESS: 3111 ENCL: 02

SUB CODE: TP NO REF SOV: 002 OTHER: 013

Card 2/4

L 8652-65 EWT(1)/EWP(m)/EWT(m)/EPF(c)/EPF(n)-2/EPR/T/EPA(bb)-2/FCS(k)/EWP(b)/ EWA(1) Pd-4/Pr-4/Ps-4/Pu-4 AFTC(a)/ASD(d)/ASD(p)-3/AS(mp)-2/ASD(f)-2/BSD/ AEDC(a)/SSD/ESD(t) JD/WW/JW

ACCESSION NR: AP4044527 S/0294/64/002/004/0599/0611

AUTHOR: Petukhov, B. S.; Popov, V. N.

TITLE: Theoretical calculation of heat transfer and friction resistance in a turbulent flow in a pipe of equilibrium dissociating hydrogen

SOURCE: Teplofizika vy*sokikh temperatur, v. 2, no. 4, 1964, 599-611

TOPIC TAGS: heat transfer, dissociation, turbulent flow, hydrogen dissociation, hydrogen oxygen mixture, equilibrium dissociation

ABSTRACT: A method is given for theoretical calculation of heat transfer and friction resistance in a turbulent flow of dissociating hydrogen in a pipe. It is assumed that the dissociation rate exceeds considerably the convective and diffusional mass transfer rates. In this case, chemical equilibrium is established in each point of the flow, and the composition of the mixture is a function of pressure and temperature only. In the case of equilibrium dissociation, the concentration profile in the flow may thus be defined without solving the diffusion equation. The heat transfer, friction resistance, and different

L 8652-65
ACCESSION NR: AP4044527

physical properties (specific enthalpy, specific heat, thermal conductivity, density, dynamic viscosity, and Prandtl number) were calculated at 1, 10, and 100 atm and 2000—5000K. Dissociation results in unique changes of physical properties as a function of pressure and temperature. The specific heat and the thermal conductivity change markedly with temperature and exhibit maxima. Fig. 1 of the Enclosure shows that owing to changes in physical properties caused by dissociation the heat transfer may change by 400%. Comparison of Fig. 1a and 1b shows that when the correction c_{pc}/c_p (c_p, specific heat at variable physical properties; c_p, average specific heat) is used, scattering of the data can be reduced from 380% to 20%. This signifies that the heat transfer is basically influenced by changes in the specific heat, and the effect of changes in viscosity and density on heat transfer does not exceed 30%. Orig. art. has: 40 formulas and 5 figures.

ASSOCIATION: none

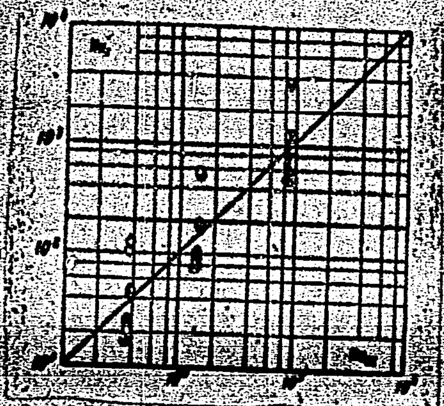
SUBMITTED: 15May64 ATD PRESS: 3111 ENCL: 02

SUB CODE: FP NO REF SOV: 002 OTHER: 013

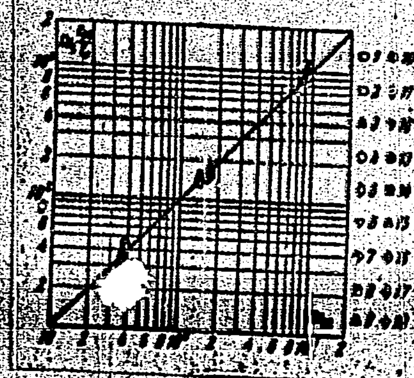
Card 2/4

L 8652-65
ACCESSION NR: AP4044527

ENCLOSURE: 01



a



b

Card 3/4

L 3652-65
ACCESSION NR: AP4044527

ENCLOSURE: 02

P, atm	1		10		100	
T_0, °K / Re_0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
$1.45 \cdot 10^4$	1	4	7	10	13	16
10^5	2	5	8	11	14	17
[illegible]$\cdot 10^5$	3	6	9	[illegible]	[illegible]	[illegible]

Fig. 1. Influence of variable physical properties on heat transfer. (Nu_c and N_{oc} are Nusselt numbers at variable and constant physical properties at the same Reynolds and Prandtl numbers.)

Card 4/4

PETUKHOV, B.S.; POPOV, V.N.

Theoretical calculation of the heat transfer and frictional resistance in the laminar flow in tubes of an incompressible fluid with variable physical properties. Teplofiz. vys. temp. 1 no.2:228-237 S-O'63. (MIRA 17:[illegible])

1. Moskovskiy energeticheskiy institut.

ACCESSION NR: AP4017720 S/0294/63/001/003/0416/0424

AUTHORS: Petukhov, B. S.; Royzen, L. I.

TITLE: Experimental investigation of heat exchange in the case of turbulent flow of gas in tubes of annular cross section

SOURCE: Teplofizika vy*sokikh temperatur, v. 1, no. 3, 1963, 416-424

TOPIC TAGS: heat exchange, annular cross section tube, turbulent air flow, unilater heat supply, heat transfer coefficient, Reynolds number, heat flux density, thermal flow stabilization, hydrodynamic flow stabilization

ABSTRACT: In order to ascertain the effect of the geometry on heat exchange in tubes with annular cross sections, a topic far from fully explained in the literature, the authors consider a procedure and the results of an experimental investigation of heat exchange for turbulent flow of air in such tubes with a diameter ratio ranging

ACCESSION NR: AP4017720

from 0.07 to 0.7. The principal measurements were made with unilateral heat supply, i.e., with constant density of heat flow in one of the walls, the other wall being thermally insulated. The heat transfer coefficients were measured on the heated walls and the adiabatic wall temperatures on the insulated walls. The Reynolds number range was from 10^4 to 3×10^5. The coefficients were calculated using relations derived in an earlier paper (Inzh.-fiz. zh. no. 3, 1963). To check on these relations, some of the experiments were carried out with both walls heated simultaneously. The data obtained make it possible to calculate the heat exchange for an arbitrary ratio of heat-flux densities on the inner and outer walls. The data can be used to calculate heat transfer in annular tubes in regions with thermal and hydrodynamic stabilization of the flow, for an arbitrary ratio of heat load on the walls. Orig. art. has: 7 figures, 6 formulas, and 3 tables.

ACCESSION NR: AP4017720

ASSOCIATION: Moskovskiy energeticheskiy institut (Moscow Power Engineering Institute)

SUBMITTED: 06Oct63 DATE ACQ: 23Mar64 ENCL: 01

SUB CODE: PH NR REF SOV: 004 OTHER: 005

Card 3/4

PETUKHOV, B.S.; KIRILLOV, V.V.; TSZYUY TSZY-SYAN [Chü Ts'ü-hsiang]; MAYDANIK, V.N.

Experimental study of the effect of the temperature factor on heat transfer during turbulent gas flow in pipes. Teplofiz. vys. temp. 3 no.1:102-108 Ja-F '65. (MIRA 18:4)

1. Moskovskiy energeticheskiy institut.

L [illegible] [illegible] [illegible]
ACC NR: AP7003053 (A) SOURCE CODE: [illegible]

AUTHOR: Petukhov, G. G.; Svirezheva, S. S.; Druzhkov, O. N.

ORG: none

71

TITLE: Thermal decomposition of tricyclohexylsilane and tricyclohexylgermane

SOURCE: Zhurnal obshchey khimii, v. [illegible], no. 5, 1966, 914-91[illegible]

TOPIC TAGS: silane, thermal [illegible]

ABSTRACT: The thermal decomposition of tricyclohexylsilane at [illegible] and tricyclohexylgermane at 400-450° was studied. The main decomposition products of tricyclohexylsilane were methane, ethane, benzene, carbon, silicon, and highly condensed compounds, containing cyclohexyl rings; no hydrogen was present in the decomposition products. The [illegible] decomposition products of tricyclohexylgermane [illegible] hydrogen, cyclohexane, benzene, germanium, cyclohexene, and highly condensed compounds containing cyclohexyl rings. It was proposed that the thermal decomposition of tricyclohexylsilane and tricyclohexylgermane occurs in stages according to a hydride mechanism, accompanied by secondary processes of conversion of the reaction products formed (hydrogenation, dehydropolymerization, condensation). Orig. art. has: 1 table. /JPRS/

SUB CODE: 07 / SUBM DATE: 26May65 / ORIG REF: 003 / OTH REF: 003

Card 1/1

ACC NR: AP7000777 SOURCE CODE: UR/0208/66/... .../1019/1028

AUTHOR: Petukhov, I. V. (Moscow)

ORG: none

TITLE: On one scheme of difference approximation for the numerical solution of parabolic type equations

SOURCE: Zhurnal vychislitel'noy matematiki i matematicheskoy fiziki, v. 6, no. 6, 1966, 1019-1028

TOPIC TAGS: approximate solution, approximation calculation, approximation convergence, approximation method, parabolic differential equation, differential equation solution

ABSTRACT: An autonomous scheme for the difference approximation of the derivative $\partial u/\partial x$ of the second order of precision was proposed. This is used without loss of precision or degree of calculation stability in the case of the degeneration (full or partial) of a parabolic type equation to an ordinary differential equation (in y). The scheme is useful in boundary layer problems of gas flow, and one such problem for a spherical truncated cone is analyzed. The equation is of the type

$$a\dot{u} = L[u], \quad a(x, y) \geqslant 0,$$

$$L[u] \equiv (mu')' + k_2u' + k_1u + k_0, \quad m(x, y) > 0$$

Card 1/3 UDC: 519:517.944/.947

ACC NR: AP7000777

in scheme II. The method is compared with the iteration process and also with studies in regard to a Fourier series of normalized eigenfunctions. Orig. art. has: 3 tables, 2 figures, and 26 formulas.

SUB CODE: 12/ SUBM DATE: 27Oct65/ ORIG REF: 004

Card 3/3

L 06212-67 EWT(d)/EWT(l)/EWP(m)/EWT(m)/EWP(w) IJP(c)

ACC NR: AP6028344 SOURCE CODE: UR/0293/66/004/004/0641/0644

AUTHOR: Petukhov, S. V.

ORG: none

TITLE: On one method for approximate solution of the Euler-Lambert equation

SOURCE: Kosmicheskiye issledovaniya, v. 4, no. 4, 1966, 641-644

TOPIC TAGS: approximation calculation, elliptic orbit, hyperbolic orbit, orbit semimajor axis, orbit calculation, electronic computer

ABSTRACT: A method described in this paper allows the semimajor axis of an orbit to be determined in explicit form directly from the flight time in the range of angular distances of $0° < \varphi < 360°$. The following normalized energy characteristic of the orbits is examined

$$\bar{\chi} = \frac{a_b}{a} = f(\tau),$$

where a is the semimajor axis of the flight orbit; $\tau = \Delta t/\Delta t_b$, and where a_b and Δt_b correspond to the flight in the boundary elliptic orbit and are completely determined by the geometry of the flight (r_1, r_2, φ). The relation

$$\bar{\chi}_a = A + \frac{B}{\tau} + \frac{C}{\tau^2}$$

UDC: 629.197.7

Card 1/2

L 06212-67

ACC NR: AP6028344

can be used to approximate the normalized energy characteristics (see Fig. 1).

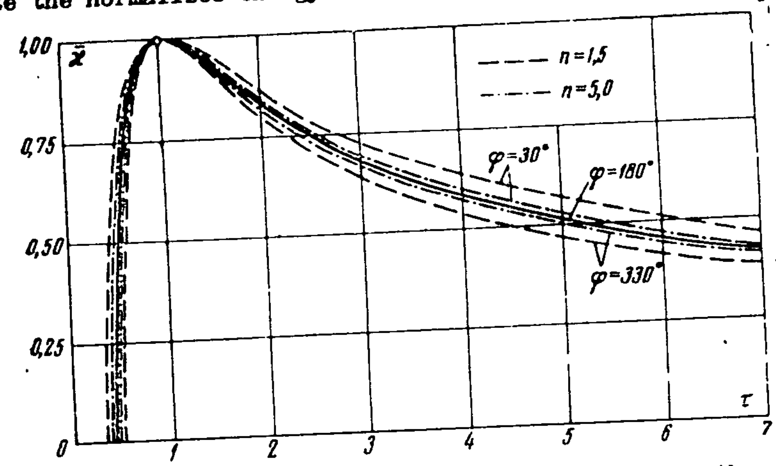


Fig. 1. Normalized energy characteristics.

Here A, B, and C are calculated from the condition of passage of the curve through two points and equality of the derivative $d\bar{x}_0/d\tau$ to zero at point (1.1). The relations given can be used to construct a unit for calculation of zeroth approximations of the semimajor axis with a computer. The results can be refined by using any method of successive approximations. The author thanks V. A. Il'in and S. V. Dubovskiy for useful comments. Orig. art. has: 5 formulas and 4 graphs.

SUB CODE: 12, 22/ SUBM DATE: 25Mar65/ ORIG REF: 003

Card 2/2

L 08374-67

ACC NR: AR6028150 SOURCE CODE: UR/0058/66/000/005/H079/H079

37

AUTHOR: Grigor'yeva, V. M.; Petukhova, S. V.

TITLE: Methodological hints on the measurement of noise of ultrasonic installations under production conditions

SOURCE: Ref. zh. Fizika, Abs. 5Zh554

REF. SOURCE: Nauchn. raboty in-tov okhrany truda VTSPS, vyp. 6(38), 1965, 55-64

TOPIC TAGS: ultrasonics, acoustic noise, acoustic measurement

ABSTRACT: Measurement conditions are formulated, measuring apparatus is suggested, and a procedure is described for carrying out the measurements and for processing the results. The appendices contain the permissible levels of sound pressures at operating locations of ultrasonic installations (from Gigenich. trebovaniya (Hygiene Requirements) no. 515a - 64), and also the characteristics of measuring instruments and some tables for reference. [Translation of abstract]

SUB CODE: 20

Card 1/1 nst

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001240710002-4"

124-58-9-10149

Translation from: Referativnyy zhurnal, Mekhanika, 1958, Nr 9, p 107 (USSR)

AUTHOR: Petukhov, A. I.

TITLE: Determination of the Water Seepage Rate During the Desiccation of a Coal-particle Medium Having a High Degree of Nonuniformity of the Particle Size (Opredeleniye skorosti fil'tratsii vody pri obezvozhivanii ugol'noy sredy s bol'shim koeffitsiyentom neodnorodnosti chastits uglya po krupnosti)

PERIODICAL: Izv. Dnepropetr. gorn. in-ta, 1957, Vol 27, pp 113-119

ABSTRACT: Results of tests are adduced relative to the determination of the influence of the grain-size composition (presence of a filler) on the filtration properties of a mixture of coal grains. A maximal diminution of the filtration properties of the mixture of coal grains was observed for a 32-34% content of small filler grains. The seepage rate of the water in a coal-grain medium with small-grain filler can be determined by the formula $v_c = cv_3m_1$, where m_1 is the porosity coefficient of the "skeleton" of the coal-grain medium, v_3 is the seepage rate in the filler; and c is an empirical coefficient having a mean value of 1.42 (in eight different mixtures). ... [illegible] mining--USSR 2. Water--Penetration 3. [illegible] particles--Determination 4. Mathematics--Applications

A.A. [illegible]

Card 1/1

PETUKHOV, B.S., doktor tekhn.nauk, prof.; KOVALEV, S.A., inzh.

Methods and some results of the critical load measurement during the transition from film- to bubble boiling. Teploenergetika no.5:65-70 My '62. (MIRA 15:4)

1. Moskovskiy energeticheskiy institut.
(Ebullition)

S/0294/63/001/002/0228/0237

ACCESSION NR: AP4004144

AUTHORS: Petukhov, B. S.; Popov, V. N.

TITLE: Theoretical calculation of heat transfer and friction resistance in laminar flow in pipe of incompressible fluid with variable physical properties

SOURCE: Teplofizika vy*sokikh temperatur, v. 1, no. 2, 1963, 228-237

TOPIC TAGS: heat transfer, laminar flow, coolant, air heat transfer, hydrogen heat transfer, MS-20 oil heat transfer, transformer oil heat transfer, hydraulic resistance, Nusselt number, incompressible fluid, fluid flow, incompressible flow

ABSTRACT: Although calculations of heat exchange and hydraulic resistance in laminar flow of liquids with variable physical properties in pipes are encountered in many branches of engineering, the existing theoretical papers are devoted only to limited aspects of the problem, and none contain an analytic expression for the heat transfer. The authors derive analytic expressions for the Nusselt number and the hydraulic resistance coefficient for laminar flow in

Card 1/2

ACCESSION NR: AP4004144

a pipe, away from the inlet, for an incompressible liquid with arbitrary temperature variation of the physical properties. These analytic expressions are used to calculate the heat emission and the friction resistance for air, hydrogen, water, Ms-20 oil, and transformer oil. In the calculations for oil and water, the viscosity ratio μ_{wall}/μ_{liq} ranged from 0.16 to 51. The temperature factor T_{wall}/T_{liq} for air and hydrogen ranged from 0.4 to 1.75. Empirical equations are derived for the Nusselt number and the friction resistance. Orig. art. has: 3 figures, 14 formulas, and 1 table.

ASSOCIATION: Moskovskiy energeticheskiy institut (Moscow Power Engineering Institute)

SUBMITTED: 18Jul63 DATE ACQ: 26Dec63 ENCL: 00

SUB CODE: AI, PR NO REF SOV: 004 OTHER: 006

Card 2/2

PETUKHOV, B.S.; GENIN, L.G.

Heat transfer in tubes with internal heat sources in a liquid flow. Inzh.-fiz. zhur. 6 no.4:3-8 Ap '63. (MIRA 16:5)

1. Institut vysokikh temperatur pri Moskovskom energeticheskom institute.

(Heat—Transmission) (Hydrodynamics)

L 11181-63 EPR/EPF(c)/EWT(1)/BDS/T-2--AFFTC/ASD--Ps-4/Pr-4/Pi-4 67
ACCESSION NR: AP3001548 S/0143/63/000/004/0081/0089 68

AUTHOR: Petukhov, B. S. (Dr. of technical sciences, Prof.); Kovalev, S. A. (Engineer)

TITLE: Critical boiling-liquid thermal loads 21

SOURCE: IVUZ. Energetika, no. 4, 1963, 81-89

TOPIC TAGS: boiler load, film-type boiling, nucleate-type boiling

ABSTRACT: At a certain "equilibrium" thermal load, both types of boiling -- the film and the nucleate -- are stable at a given heating surface (see article in Teploenergetika, No 5, 1962, by the same authors). When the load is higher than the equilibrium, only the film type is stable; when the load is lower than the equilibrium, then the nucleate type is stable. The present article submits: (a) some results of experiments with the nucleate boiling of large volumes of water at pressures up to 85 atm. and (b) a general method for calculating the equilibrium loads. The experimental outfit included an electrically heated 2-mm nichrome wire immersed in a pressure tank with water. At 80 atm., the critical load was measured around 150 x 10 sup 3 kilocalories/sq. m. hr. Engineer V. V. Karelin took part in the experimental work. Equilibrium load with boiling at the

Card 1/2

L 11181-63
ACCESSION NR: AP3001548

outer surface of an infirite cylinder is described mathematically. Some peculiarities of the film-type boiling in tubes are considered. In conclusion, the authors criticize the existing method of selecting the maximum permissible load for a given heating surface. Orig. art. has: 4 figures and 8 formulas.

ASSOCIATION: Moskovskiy ordena Lenina energeticheskiy institut, Kafedra inzhenernoy teplofiziki (Moscow Power-Engineering Institute, Chair of Engineering Thermal Physics)

SUBMITTED: 03Dec62 DATE ACQD: 21Jun63 ENCL: 00

SUB CODE: 00 NO REF SOV: 003 OTHER: 001

ch/W
Card 2/2

S/170/63/006/003/001/014
B104/B186

AUTHORS: Petukhov, B. S., Royzen, L. I.

TITLE: Heat transfer in tubes with annular cross section

PERIODICAL: Inzhenerno-fizicheskiy zhurnal, v. 6, no. 3, 1963, 3 - 11

TEXT: In this study the following assumptions are made: there is stationary flow of an incompressible liquid through a tube with annular cross section; the heat flow densities q_{c_1} and q_{c_2} to the inner and to the outer tube wall are constant; the heat transfer along the tube axis by heat conduction is small compared with the convective heat transfer; the physical properties of the liquid are independent of temperature; energy dissipation is negligible. Applying the condition of a stabilized temperature field yields the equation

$$CW_x R = \frac{\partial}{\partial R}\left[R\left(1 + \frac{\varepsilon_q}{a}\right)\frac{\partial \vartheta}{\partial R}\right],$$

$$C = \frac{2(q_{c_1} r_1 + q_{c_2} r_2) r_2^2}{\lambda (r_2^2 - r_1^2)}. \quad (6)$$

Card 1/3

S/170/63/006/003/001/014
B104/B186

Heat transfer in tubes with ...

which is solved for the boundary conditions

$$\left(R\frac{\partial t}{\partial R}\right)_{R=R_1} = \frac{q_{c_1} r_1}{\lambda}, \quad \left(R\frac{\partial t}{\partial R}\right)_{R=1} = \frac{q_{c_2} r_2}{\lambda}, \quad (\varepsilon_q)_{R=R_1,1} = 0. \qquad (A).$$

Here, W_x is the reduced velocity of the liquid, $R = r/r_2$, $R_1 = r_1/r_2$, r is the running parameter. Integrating (6) from R_1 to R and introducing the reduced temperature

$\Theta = \dfrac{(t - t_{c_1})\lambda}{q_c r_1 + q_{c_2} r_2}$, yields (8),

$$\Theta = \frac{2}{(1-R_1^2)} \int\limits_{R_1}^{R} \frac{\int\limits_{R_1}^{R} W_x R\,dR}{\left(1+\beta\frac{\varepsilon_\tau}{\nu}\Pr\right)R}\,dR - P\int\limits_{R_1}^{R} \frac{dR}{\left(1+\beta\frac{\varepsilon_\tau}{\nu}\Pr\right)R},$$

where ε_q/a is replaced by $\beta\varepsilon_\tau \Pr/\nu$; $\beta = \varepsilon_q/\varepsilon_\tau$, $P = q_{c_1} r_1/(q_{c_1} r_1 + q_{c_2} r_2)$.

Card 2/3

S/170/63/006/003/001/014
Heat transfer in tubes with ... B104/B186

Here ε_q is the factor of turbulent heat transfer, and ε_τ the factor of turbulent momentum transfer. From these equations integral relations for the temperature field and for the heat transfer coefficients are derived for arbitrary heat loads on the walls. Finally the heat transfer of a laminar flow in annular tubes is calculated numerically. There are 4 figures and 1 table.

ASSOCIATION: Energeticheskiy institut, g. Moskva (Power Engineering Institute, Moscow)

SUBMITTED: October 2, 1962

Card 3/3

PETUKHOV, B.S., doktor tekhn.nauk, prof.; KOVALEV, S.A., inzh.

Critical thermal loads during the boiling of a liquid. Izv. vys. ucheb. zav.; energ. 6 no.4:81-89 Ap '63. (MIRA 16:5)

1. Moskovskiy ordena Lenina energeticheskiy institut. Predstavlena kafedroy inzhenernoy teplofiziki.
(Thermodynamics) (Fluid dynamics)

PETUKHOV, B.S.; POPOV, V.N.

Theoretical calculation of heat transfer and frictional resistance in the turbulent flow of an incompressible fluid of variable physical properties in pipes. Teplofiz. vys. temp. 1 no.1:85-101 Jl-Ag '63. (MIRA 16:10)

1. Moskovskiy energeticheskiy institut.

PETUKHOV, B. V.

ARKHANGEL'SKIY, P.Ye., inzhener; ARKHIPOV, P.P., inzhener; VAS'KOV, M.P., agronom; ZHMUDSKIY, D.A., arkhitektor; IVANOV, A.P., arkhitektor; KIBIREV, S.F., arkhitektor; KRYLOV, N.V., inzhener-arkhitektor; KULAKOV, D.V., arkhitektor; MARTYNOV, P.F., inzhener; NIKIFOROV, V.S., inzhener; NOSKOV, B.G., arkhitektor; PETUKHOV, B.V., kandidat tekhnicheskikh nauk; RUDANOV, M.L., kandidat tekhnicheskikh nauk; RYAZANOV, V.S., kandidat arkhitektury; SOKHRANICHEV, N.S., inzhener-arkhitektor; TARASOV, D.I., arkhitektor; SHMIDT, N.E., kandidat arkhitektury; KHOMUTOV, Ye.Ye., arkhitektor; VOL'FOVSKAYA, V.N., redaktor; FEDOTOVA, A. F., tekhnicheskiy redaktor.

[Handbook on the construction of farm buildings] Spravochnik po sel'skokhoziaistvennomu stroitel'stvu. Avtorskii kollektiv: P.E.Arkhangel'skii i dr., avtor-sost. N.V.Krylov. Moskva, Gos.izd-vo sel'khoz.lit-ry. Vol.3 1955. 843 p. (MLRA 9:6)

(Farm buildings)

[illegible], R.[illegible]

[illegible], [illegible]: "[illegible]".
Ivanov, [illegible] Ivanovo [illegible] logist.
Inst. (Dissertations [illegible])

SO: Knizhnaya Letopis' [illegible].

Petukhov, B.V.

Increase of hydrophilic nature by hydroxyethylation of nylon fibers. B. V. Petukhov and A. B. Pakshver (Inst. Chem. Tech., Ivanovo). *Kolloid. Zhur.* 18, 741-4(1956).—Treating stretched nylon fibers with ethylene oxide causes uptake of C_2H_4O groups, an orange-red coloration, and change of properties. E.g., the sorption x/m of H_2O vapor at relative humidities above 40% was decreased by treatment at 17° for 120 hrs., not altered by heating at 100° for 20 hrs., and increased by treatment for 20 hrs. at 128°. After 20 hrs. at 117°, the uptake of C_2H_4O lowered the N content of nylon from 12.08 to 11.18%. Small addns. of MeOH to C_2H_4O depressed x/m, but a mixt. of MeOH 1, C_2H_4O 2 mols. reacted with nylon more rapidly than did C_2H_4O alone (e.g., N content was 10.25% after 10 hrs. at 117°) and gave colorless fibers. These fibers were sol. in warm MeOH, their m.p. was about 15° below that of nylon, the breaking stress was by 10-40% lower, the total elongation unchanged, and the modulus of elasticity for small extensions about one-third that of nylon. They were more easily dyed, and the diffusion coeff. of H_2O vapor in them was greater (8 against 4×10^{-9} sq. cm./sec.) than before treatment.

J. J. Bikerman

4
1 pm
2 May

USSR/Physical Chemistry. Surface Phenomena. Adsorption Chromatography. Ion Exchange. B-13

Abs Jour : Ref Zhur - Khimiya, No 7, 1957, 22545.

Author : B. V. Fetulnov, A. B. Pakshver.
Inst : Not given
Title : Steam sorption by caprone fiber.

Orig Pub : Zh. prikl. khimii, 1956 29, No 8, 1236-1242 (russ).

Abstract : Oriented caprone fibres, treated without tension by an aqueous phenol solution reduce steam sorption (S) at low values of relative humidity s and increase S at high s. Treatment of fiber under tension has no influence on the value and rate of S. Thermal treatment reduces S of steam, this reduction is stronger if the fiber is heated under tension, than when heated without one. The process of compression of molecular structure by heating caprone fiber proceeds very fast and ends in 30 seconds. Steam S does not depend on macromolecule orientation, but depends on the quantity of intermolecular bonds. At the relative humidity ≤ 25%, the diffusion coefficient does not depend on steam elasticity at given temperature. Deformation index of the caprone fiber increases sharply with the heating of the fiber by overheated steam under tension.

Card 1/1 -188-

KONKIN, A.A., kand. tekhn. nauk; PETUKHOV, B.V., kand. tekhn. nauk.

Production of dacron fibers in the U.S.S.R. Tekst. prom. 18 no.1: 15-16 Ja '58. (MIRA 11:2)

(Textile fibers, Synthetic)

[illegible]

L 24696-65 EWT(m)/EWP(j)/T Pc-4 RM

ACCESSION NR: AP4049878 S/0183/64/000/006/0018/0022

AUTHOR: Ayzenshteyn, E. M.; Petukhov, B. V.

TITLE: Effect of molecular weight on orientative drawing and properties of Dacron fiber

SOURCE: Khimicheskiye volokna, no. 6, 1964, 18-22

TOPIC TAGS: Dacron, polyethylene terephthalate, fiber, film, crystallization, mechanical property, plastic deformation, strength, fatigue property, creep

ABSTRACT: The effect of changing the molecular weight of the polyethylene terephthalate from 17500 to 25000 on the drawing of the Dacron fiber (drawn from #6.2-6.5 to #34-36) and the fiber properties were investigated. The tendency of the isotropic (unstretched) fiber to age and to crystallize on heating decreased with increasing molecular weight. With increasing molecular weight the tension upon drawing increased, the maximum extent to which the fiber could be effectively drawn decreased, and the fiber adhered less to the metal surface of the heating element. A study of the drawing temperature-mechanical property relationship

Card 1/2

L 24696-65
ACCESSION NR: AP4049878

2

showed the optimum drawing temperature was determined by the drawing rate and factor and the material molecular weight. Drawing at temperatures above the optimum decreased the dynamic resistance of the fiber. The modulus of elasticity of isotropic fiber was almost independent of molecular weight, but increased in anisotropic fiber as the molecular weight increased. Increase in molecular weight reduced the tendency toward irreversible plastic deformation, improved the fatigue properties, fiber strength, pliability and dynamic resistance of the polyester fiber, permitted a higher optimum drawing temperature, and decreased the creep on heating. Orig. art. has: 8 figures and 3 tables

ASSOCIATION: VNIIV; VNIISV

SUBMITTED: 22Nov63 ENCL: 00

SUB CODE: MT NO REF SOV: 019 OTHER: 000

Card 2/2

PETUKHOV, B.V.; KONKIN, A.A.

Technology of the manufacture of the polyester fiber "lavsan". Khim. volok. no.2:11-16 '59. (MIRA 12:9)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut iskusstvennogo volokna.

(Rayon)

Petukhov, B.V.

SOV/63-4-3-19/31

AUTHORS: Mogilevskiy, Ye.M., Candidate of Technical Sciences, Finger, G.G.

TITLE: Scientific-Technical Conferences and a Seminar on the Production and Processing of Chemical Fibers

PERIODICAL: Khimicheskaya nauka i promyshlennost', 1959, Vol 4, Nr 3, pp 398-401 (USSR)

ABSTRACT: In November-December 1958 the All-Union Scientific-Technical Conference on Problems of the Application of Chemical Fibers in the Textile, knit goods and Haberdashery [illegible] It was attended by 300 persons of plants and scientific research and designing installations. The President of the Gosudarstvennyy komitet Soveta ministrov SSSR po khimii (State Committee for Chemistry in the Council of Ministers of the USSR) V.S. Fedorov pointed out the great importance of developing the production of chemical fibers. A.L. Borisov (Upravleniye khimicheskikh volokon - Board of Chemical Fibers) read a paper on the tasks of workers of the industry of chemical fibers; Candidate of Technical Sciences G.I. Kudryavtsev (VNIIV) on the subjects of research work in the field of chemical fibers; S.L. Dich (GIPROIV) on new techniques applied in newly built plants; I.G. Shishko (Kiyevskiy kombinat iskusstvennykh volokon - Kiyev Combine of Artificial Fibers) on research conducted in the combine concerning the production of caprone fiber and artificial silk; V.P. Yunitskiy (Kalininskiy kombinat - Kalinin Combine) on technical improvements in the Combine; Professor N.V. Mikhaylov on: "Work in the Field of Preparing Highly-Resistant Viscose Cord"; S.M. Geysberg (Leningradskiy zavod iskusstvennogo volokna - Leningrad Plant of Artificial Fibers) on the experience of introducing a unit for the continuous production of alkali cellulose; Candidate of Technical Sciences Ye.M. Mogilevskiy (VNIIV) on the development of apparatuses for the continuous production of viscose silk; I.P. Zakharov and S.P. Lipinskiy (VNIIV) on increasing the spinning rate for viscose silk to 90 - 95 m/min and on the electric spindle EV-3 developed by them; L.M. Slobodkina, Kalinin Combine, on the method of regenerating the precipitation tank by contact with smoke gases which has been developed in the USSR; B.G. Zabrodin, Kalinin Combine, and Ye.P. V[illegible] (Mogilevskiy zavod iskusstvennogo volokna - Mogilev Plant of Artificial Fiber) on the work of viscose fiber plants and its improvement; N.N. Agranovskiy (VNIIV) and Ye.S. Markov (GIPROIV) on the production of carbon disulfide; G.A. Borodichev, Kalinin Combine, on the work of an installation for the [illegible] of carbon disulfide; N.A. [illegible], Kiyev Combine, and Candidate of Technical Sciences M.D. [illegible] (VNIIV) on the continuous production of caprolactam and the spinning of caprone silk; Candidate of Technical Sciences E.V. [illegible] (VNIIV) on the production of caprone cord fiber; N.I. Petrunin, Kalinin Combine, and Candidate of Technical Sciences B.V. Petukhov (VNIIV) on the production of the fibers nitron and lavsan; T.A. [illegible] (Klinskiy kombinat - Klin Combine) on the improvement of the quality of caprone cord and silk. A seminar on the subject: "New Technique and Advanced Technology in the Production of Artificial and Synthetic Fibers and Semi-Finished Products for Them" took place December 18-20, 1958. N.Ya. Ale[illegible] read a paper on the development of chemical fibers; Candidate of [illegible] Sciences G.I. Kudryavtsev on achievements in the field of the [illegible] of synthetic fibers; Candidate of Technical Sciences Ye.M. M[illegible] on technological achievements in the production of viscose fibers; [illegible] Finger (VNIIV) on the acceleration of the desulfuration process of viscose silk without application of alkali reagent; A.P. Kraynov [illegible] VNIIV) on the formation of fibers from triacetylcellulose sirups; Candidate of Technical Sciences A.A. Beer on "The Preparation of Monomers for Synthetic Fibers Based on the Reaction of Telomerization"; Candidate of Technical Sciences A.A. Artem'yev and Ye.V. [illegible] (GIAP) on the preparation of raw material for polyamide fibers; Candidate of Technical Sciences K.S. Khaylov and Ye.G. Vendel'shteyn (GIAP) on the preparation of dimethylterephthalate for polyester fiber.

Card 3/6

Card 4/6

Card 5/6

5(3) SOV/80-32-5-47/52

AUTHORS: Pet[redacted]nkin, A.A.

TITLE: The Combination of the Reactions of Reesterification and Polycondensation in the Synthesis of Polyethyleneterephthalate

PERIODICAL: Zhurnal prikladnoy khimii, 1959, Vol 32, Nr 5, pp 1171-1173 (USSR)

ABSTRACT: Polyethyleneterephthalate is the base of the polyester fiber "lavsan". It is produced by the reesterification of the dimethyl ether of the terephthalic acid and ethylene glycol to diglycol ether, and the polycondensation of the latter to polyethyleneterephthalate. Ethylene glycol is used in the quantity of more than two moles per one mole of diethyl ether. Experiments were made to use less than two moles in the reaction. For this purpose 0.05% of zinc acetate was used as a catalyst. The yield was approximately the same as in the ratio 2.5 : 1 The products obtained had a sufficiently high molecular weight, which could not be expected, if the unreacted methoxy-groups had blocked the ends of the chain. The formed ethyleneglycol remains in the sphere of reaction due to the increasing viscosity and the ratio may be therefore less than 2 : 1.

Card 1/2

SOV/80-32-5-47/52

The Combination of the Reactions of Reesterification and Polycondensation in the Synthesis of Polyethyleneterephthalate

There are: 1 diagram, 1 graph, 1 table and 2 references, 1 of which is Soviet and 1 English.

ASSOCIATION: Vsesoyuznyy nauchno-issledovatel'skiy institut iskusstvennogo volokna (All-Union Scientific Research Institute of Artificial Fiber)

SUBMITTED: January 20, 1958

Card 2/2

POLYAKOV, Yu.I.; PETUKHOV, B.V.

Energy-impulse tensor in the S-matrix theory. Vest. Mosk. un. Ser. 3: Fiz., astron. 20 no.5:18-23 S-O '65. (MIRA 18:11)

1. Nauchno-issledovatel'skiy institut yadernoy fiziki Moskovskogo universiteta. Submitted February 29, 1964.

PETUKHOV, B.V.; POLYAKOV, Yu.I.; SHIROKOV, Yu.M.

Relationship between form factors of the single-particle matrix element of the energy-impulse tensor and the charge and magnetic moment. Vest. Mosk. un. Ser. 3: Fiz., astron. 2 no.5:14-17 S-O '64. (MIRA 18:1)

1. Nauchno-issledovatel'skiy institut yadernoy fiziki Moskovskogo universiteta. Submitted February 29, 1964.

PETUKHOV, B.V.; KONDRASHOVA, S.M.

Properties of the copolymer of poly-(ethylene terephthalate - ethylene adipinate) and of the fibers based on it. Khim. volok. no.1:55-60 '62. (MIRA 18:4)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut steklyannogo volokna.

[illegible], B.V.

[illegible]

[illegible]

[illegible]

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001240710002-4"

AYZENSHTEYN, E.M.; PETUKHOV, B.V.

Effect [illegible] molecular weight on the [illegible] properties of lavsan fibers. [illegible]

[illegible] Vsesoyuznyy [illegible] (for Ayzenshteyn). [illegible]

APPROVED FOR RELEASE: 06/15/2000 CIA-RDP86-00513R001240710002-4"

PETUKHOV, B.V.

Conference on the exchange of experience in the use of therapeutic solar reflectors. Vop. kur. fizioter. i lech. fiz. kul't. 25 no. 3:281-283 My-Je '60. (MIRA 14:4)
(SOLAR ENERGY--THERAPEUTIC USE)

PETUKHOV, B.V.; KONDRASHOVA, S.M.

Isomorphous substitution in polyethylene terephthalate. Vysokom. soed. 3 no.5:657-661 My '61. (MIRA 14:5)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut iskusstvennogo volokna.

(Terephthalic acid) (Adipic acid)

TEREKHOVA, G.M.; PETUKHOV, B.V.

Blocking of the end groups of polyethylene terephthalate by o-phosphoric acid. Khim.volok. no.4:8-10 '60. (MIRA 13:10)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut iskusstvennogo volokna.
(Terephthalic acid) (Phosphoric acid)

PHASE I BOOK EXPLOITATION SOV/5098

Petukhov, Boris Vladimirovich

Poliefirnoye volokno; terilen, lavsan (Polyester Fiber; Terylene, Lavsan [Dacron]) Moscow, Goskhimizdat, 1960. 85 p. 6,000 copies printed.

Ed.: S. I. Babushkina; Tech. Ed.: V. V. Kogan.

PURPOSE: This booklet is intended for personnel in the chemical and synthetic fiber industries. It may also be used by specialists in other industries that process or use synthetic fibers.

COVERAGE: The booklet deals with the theoretical and practical principles of the manufacture of polyester fibers from polyethylene terephthalate. It describes the properties of these fibers and their fields of application. No personalities are mentioned. There are 145 references: 19 Soviet, English, 13 German, 12 French, and 12 other.

Card 1/4

PETUKHOV, Boris Vladimirovich; BABUSHKINA, S.I., red.; KOGAN, V.V., tekhn.red.

[Polyester fiber (terylene, lavsan)]. Poliefirnoe volokno; terilen, lavsan. Moskva, Gos.nauchno-tekhn.izd-vo khim.lit-ry, 1960. 85 p. (MIRA 13:11)

(Rayon)

15.8101 2109, 2203

S/183/60/000/004/002/
B004/B058

AUTHORS: Terekhova, G. M., Petukhov, B. V.

TITLE: Blocking of the End Groups of Polyethylene Terephthalate by Means of o-Phosphoric Acid

PERIODICAL: Khimicheskiye volokna, 1960, No. 4, pp. 8 - 10

TEXT: The Lavsan fiber (polyethylene terephthalate), obtained by the reaction of dimethyl terephthalate with ethylene glycol, takes on a yellow color at the high polycondensation temperature (275-280°C) owing to oxidation and thermal destruction of the end groups, predominantly the hydroxyl groups. The authors report on experiments to block these end groups by means of ortho-phosphoric acid. The polycondensation took place at 1-2 torr. The phosphoric acid was added as 15% solution in ethylene glycol at various times of the process. Fig. 1 shows that too high additions of phosphoric acid retard polycondensation. Moreover, the molecular weight of the end product is reduced, as can be seen from Fig. 2, in which the viscosity reduction under the effect of the concentration of phosphoric acid is illustrated. An addition of 0.01% of

Card 1/2