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USSR Report

ENGINEERING AND EQUIPMENT

(FOUO 1/80)

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28 January 1980

USSR REPORT

ENGINEERING AND EQUIPMENT

(FOUO 1/80)

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NON-NUCLEAR ENERGY

UDC 621.472:621.383.2

SOLAR ENERGY CONVERTER SURFACES

Moscow SELEKTIVNYYE OPTICHESKIYE POVERKHNOSTI PREOBRAZOVATELEY SOLNECHNOY ENERGII (Selective Optical Surfaces of Solar Energy Converters) in Russian 1979 signed to press 20 Mar 79 pp 4, 214-215

/Annotation and table of contents from book by Mark Mikhaylovich Koltun, Izdatel'stvo "Nauka", 1,600 copies, 216 pages/

/Text/ Questions of developing optical surfaces and coatings with selective spectral characteristics for semiconductor solar cells and arrays, which are used extensively in the autonomous obtaining of electric power in space and on earth, are covered in the monograph. The properties of selective coatings for concentrators, radiators, transparent heat-reflecting windows and thermal collectors of solar radiation are described. Methods of calculating the main optical, electrical and thermal parameters of converters with the optimum selective surfaces and coatings are presented.

The book is intended for specialists in solar energy, semiconductor instruments and optical coatings.

Tables--25, figures--85, references--213.

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/7807-459/

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CSO: 1861

INDUSTRIAL TECHNOLOGY

UDC 62-755:620.1.05:621.525:534.24

BALANCERS FOR MACHINE ROTORS

Moscow AVTOMATICHESKAYA BALANSIROVKA ROTOROV MASHIN (Automatic Balancing of Machine Rotors) in Russian 1979 signed to press 9 Apr 79 pp 2, 150-151

/Annotation and table of contents from book by Anatoliy Aleksandrovich Gusarov, Valeriy Ivanovich Susanin, Lev Nikolayevich Shatalov, Boris Mikhaylovich Grushin, Izdatel'stvo "Nauka", 1,150 copies, 152 pages/

/Text/ The main materials on automatic balancing are systematized, the main demands on automatic balancers are formulated, the principle of construction of fully variable automatic balancers is set forth. Along with a description of the designs of a number of types of automatic balancers questions of theory, which concern the operation of these devices, are covered.

The book is intended for engineers and scientists, who are studying questions of increasing the life and reliability of high-speed rotor machines, as well as are engaged in the development of the theory and designs of automatic balancers. The materials set forth may also be useful to instructors of higher technical educational institutions, to students of the upper grades and post-graduate students. Tables--1, figures--86, references--75.

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/7807-465/

7807
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INDUSTRIAL TECHNOLOGY

UDC 539.4

PREDICTING THE STRENGTH OF MACHINE COMPONENTS

Kiev PROGNOZIROVANIYE PROCHNOSTI MATERIALOV I KONSTRUKTIVNYKH KOMPONENTOV MASHIN BOL'SHOGO RESURSA (Prediction of the Strength of Materials and Structural Components of Machines With a Long Life) in Russian 1977 signed to press 7 Sep 77 pp 2, 251-252

/Annotation and table of contents from book edited by V. T. Troshchenko et al., Izdatel'stvo "Naukova dumka", 850 copies, 264 pages/

/Text/ The results of studies on the development of methods of predicting the strength of the materials and structural components of machines with a long life are presented in the collection. The methods of predicting the strength and durability of materials under the conditions of long-term static and cyclical loading with allowance made for the influence of temperature and time factors are examined. The conditions of the limiting state of bodies with cracks are analyzed. The possibilities of using physical methods for predicting the process of the accumulation of defects in various materials with allowance made for their real structure are examined. The data on the prediction of the strength and durability of structural components with allowance made for the real conditions of their use are cited.

It is intended for scientists, designers and materials technologists, who work in the area of the development and study of materials and the designing of machines and components.

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/7807-460/

7807
CSO: 1861

HIGH ENERGY DEVICES, OPTICS AND PHOTOGRAPHY

UDC 535.317.25:535.81

INFLUENCE OF VIBRATIONS ON VISUAL RESOLUTION AND IDENTIFICATION OF OBJECTS OF COMPLEX FORM

Moscow IZVESTIYA VYSSHIKH UCHEBNYKH ZAVEDENIY, PRIBOROSTROYENIYE in Russian No 8, 1979 pp 71-74 manuscript received 5 Feb 78

[Article by V.A. Kosnikovskiy, Leningrad Institute of Precision Mechanics and Optics]

[Text] Experimental consideration is given to the influence of harmonic vibrations on resolution and the ability to identify objects of complex form of an optical instrument - observer system. It is demonstrated that the resolution of the system drops with an increase in the amplitude and frequency of vibrations, and in the range of 8 to 12 Hz the influence of the frequency on resolution is evidenced more slightly.

The question of the influence of harmonic vibrations on resolution and of the ability of an optical instrument - human being system to identify objects of simple form with a low amplitude of vibrations has been studied in sufficient detail, e.g., in [1,2]. In [4] it is indicated that in the vibration frequency range of 3 to 25 Hz the eye maintains its keenness of vision and the maximum permissible amplitude of vibrations equals 15' and 10' to 0.5' at frequencies of 1 to 8 and 10 to 30 Hz, respectively. In [5] is demonstrated the ability to improve the resolution of an optical projection system with the vibration of a matte screen in the image plane at a frequency of not more than 24 to 25 Hz. The increase in resolution was caused by smoothing out of inhomogeneities on the screen's surface. The maximum size of inhomogeneities in cross section reaches 40 to 50 μ.

In this paper is discussed the influence of vibrations on resolution and the identification of objects of complex form over a wide range of variation of the amplitude of vibrations. A diagram of the experiment is shown in fig 1.

An image of the test object, 2, set in the focal plane of lens 6 (f' = 400 mm, D = 40 mm) was observed through optical system 7 with a magnification of $G = 20^{\times}$. The radiation source, 1, provided a 3 to 4 nit illumination brightness for the object. Displacements of the image of the test object occurred during vibrations of mirror 3 around the axis perpendicular to the

plane of the sketch. The mirror was fastened on a single axis with a wire loop, 4, placed in a constant magnetic field, 5. The loop vibrated with the passage through it of alternating current whose frequency and amplitude were regulated by an infralow-frequency oscillator. This arrangement made it possible to vary smoothly the frequency, f , and amplitude, A , of vibrations of the image over a range of $0 \leq f \leq 100$ Hz and $0 \leq A \leq 18$ minutes of angle with an accuracy of 0.1 and 0.2 percent, respectively.

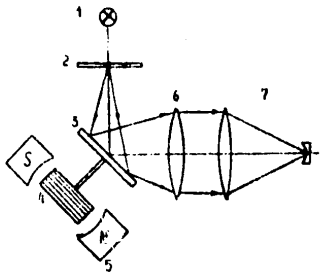

Figure 1. Diagram of Experiment

In studying the influence of vibrations on the system's resolution, as a test object were used elements of an absolute-contrast No 3 Foucault hatched optical resolution chart, oriented perpendicularly to the direction of vibration.

In these experiments the amplitude of vibrations of the test object was varied over a range of zero to approximately β , where $\beta \sim 15'$ equals half the angle of the instrument's field of view. Observations demonstrated that a considerable influence of frequency on resolution was evidenced beginning with values of 2 to 3 Hz for all the vibration amplitudes studied, and the rate of the drop in resolution increased with an increase in amplitude. Increasing the vibration frequency higher than 30 Hz does not result in a further drop in resolution.

In observing test objects the amplitude of whose vibration was greater than their angular dimensions, a frequency range was observed (8 to 12 Hz) in which resolution depended less on frequency than in other sections studied. With an increase in amplitude to 15 to 16 minutes of angle, this effect is diminished to a considerable extent.

The results of the experiment are shown in the form of graphs in fig 2.

It is obvious that the dependence of resolution on frequency with low amplitudes of vibrations (up to approximately 10 seconds of angle) is of a smooth nature and is similar to the dependences obtained in the studies in [1]. The resolution drops threefold with an increase in frequency to

30 Hz. With vibrations with an amplitude within the range of 10" to 16' is evidenced a section of a slighter influence of frequency (from 8 to 16 Hz) on resolution, which is evidenced most distinctly with an amplitude of $A \approx 5.3'$ and practically disappears with $A \approx 16'$.

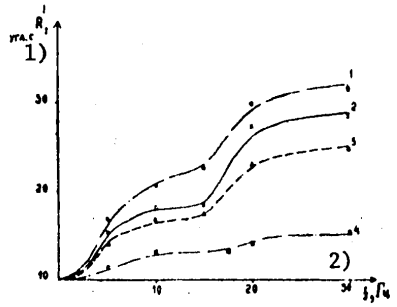

Figure 2. Dependence of Resolution on Frequency and Amplitude of Vibrations: 1--A = 16'; 2--A = 8'; 3--A = 5.3'; 4--A = 18"

Key:
1. Seconds of angle
2. Hz

In studying the influence of vibrations on the ability to identify, serving as test objects were contrasting silhouettes of various types of real objects (a ship, automobile or airplane) with different angular dimensions. The magnification of the observation system then equaled 10^X. Observations were made by an operator not having apriori information, who then had to indicate on a board the type of object presented for identification.

The experiments demonstrated that depending on the amplitude of vibrations three main situations must be distinguished.

1. The amplitude of vibrations is greater than half the field of view and the extreme positions of the test object are not visible to the operator. In this case the ability to identify is determined by the eye's ability to follow the moving image [3], and in our case was limited by a vibration frequency of approximately 3 to 4 Hz with A = 16 minutes of angle and $2\beta = 0.5°$. A further increase in frequency requires for the purpose of identification an increase in the dimensions of the object (threefold for 6 Hz), and at a frequency of $f \geq 8$ Hz identification was impossible under the conditions of the experiment.

2. The amplitude of vibrations lies within the range of $0.5\ell \leq A \leq \beta$, where ℓ is the angular dimension of the object, and β is half the angle of the field of view of the optical instrument. In this case, if the amplitude of

vibrations is unchanged during the observation period the operator receives practically error-free information on the type of object, when observing it in extreme positions at which the image is located for a longer period. The intermediate positions of the image practically do not play a role in identification of the type of object.

3. The amplitude of vibrations is less than the angular dimensions of the object. In this case vibrations in the direction perpendicular to the position of the length of the object's body practically do not cause complications in identification of the type of object. But vibrations along the object's body made it possible to identify it only with the existence of apriori or aposteriori information. The angular dimensions of objects did not play an important role.

Thus, the resolution of an optical instrument - human being system depends to a considerable extent on the amplitude and frequency of vibrations of the image of the object observed, and in the case when the amplitude of vibrations is greater than the angular dimensions of the object, but less than half the angle of the field of view of the instrument, the dependence of resolution on frequency is reduced in the range from 8 to 16 Hz. The ability to identify objects of complex form depends to a considerable extent on the amplitude of vibrations: The best conditions for identification are with an amplitude less than half the angle of the field of view of the optical instrument, but greater than the angular dimension of the object observed. With an amplitude of vibrations greater than half the angle of the field of view, the major role is played by the ability of the eye to follow the moving image. In the case when the amplitude of vibrations is less than the angular dimensions of the object, a considerable role is played by the complexity of the object's form, the direction of vibrations and the existence of apriori or aposteriori information on the type of object observed. It was not possible to explain the disagreement with the data of [4], since in it is not given information on the experimental setup and procedure.

Bibliography

1. Dubenskov, V.P., Rybkina, A.I. and Marinchenko, Yu.M. "Influence of Vibrations on the Visual Resolution of Telescope Systems," OPTIKO-MEKHANICHESKAYA PROMYSHLENNOST', No 9, 1972, p 7.

2. Dubenskov, V.P. "Influence of Vibrations of the Image on Identification of the Form of Objects," OPTIKO-MEKHANICHESKIY PROMYSHLENNOST', No 9, 1975, p 3.

3. Babayev, A.A. and Sukhoparov, S.A. "Selection of Parameters of a Stabilizing Unit for Visual Instruments," OPTIKO-MEKHANICHESKAYA PROMYSHLENNOST', No 5, 1972, p 12.

4. Nikolayev, V.Ya. "Influence of Vibrations and Jolting on the Resolution of Optical Systems," TRUDY, LENINGRADSKIY INSTITUT TOCHNOY MEKHANIKI I OPTIKI, No 73, 1973, p 31.

5. Kartashov, A.I. and Oshanina, K.S. "Investigation of the Resolution of an Optical Projection System with a Vibrating Screen. Studies in the Area of Linear Measurements," TRUDY METROLOGICHESKIKH INSTITUTOV SSSR, No 101 (151), 1968, p 124.

CSO: 8144/0343
8831

NUCLEAR ENERGY

DETECTORS FOR MEASUREMENT OF POWER GENERATION IN REACTORS

Moscow DETEKTORY DLYA VNUTRIREAKTORNYKH IZMERENIY EHNERGROVYDELENIYA in Russian 1977, signed to press 3 Nov 76 pp 2, 150-151

[Annotations and table of contents from book by Mikhail Grigor'yevich Mitel'man, Boris Grigor'yevich Dubovskiy, Vladimir Fedorovich Lyubchenko and Natal'ya Dëmitriyevna Rozenblum. Atomizdat, 1,500 copies, 152 pages]

[Text] This work is devoted to detectors for measurement of power generation in reactors. It examines basic methods of monitoring power generation. It shows that the neutron method is optimal for operative monitoring of power generation.

The work examines in detail ionization, calorimetric, activation and charge detectors. Particular attention is devoted to ionization and charge measurement methods, since calorimetric and activation methods have not been widely used for operative monitoring of power generation.

The work sets forth the theory of operation of DPZ [direct charge detectors] and the basic principles of their construction and application. The work examines specific systems for monitoring power generation in reactors.

The book is intended for engineering-technical personnel involved in design and operation of systems for monitoring power generation in reactors and also for university students--future nuclear power station engineers.

Figures 49. Tables 11. Bibliographical entries 127.

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CSO: 1861

NUCLEAR ENERGY

RADIATION SHIELDING IN NUCLEAR POWER STATIONS

Moscow RADIATSIONNAYA ZASHCHITA NA ATOMNYKH ELEKTROSTANTSIYAKH in Russian 1978, signed to press 3 Apr 78 pp 2, 263

[Annotations and table of contents from book by Viktor Viktorovich Bolyatko, Mikhail Yakovlevich Kulakovskiy, Viktor Nikolayevich Mironov, Valeriy Konstantinovich Sakharov; edited by Al'bert Petrovich Suvorov and Samuil Grigor'yevich Tsypin. Atomizdat, 2,750 copies, 264 pages]

[Text] This book acquaints the reader with a number of questions relating to calculation, design and experimental investigation of radiation shielding of nuclear power stations with various types of reactors being used in Soviet power production. The book covers all phases of creation of radiation shielding--from theoretical calculation analysis and experimental investigation using models to the point of commissioning the station, measuring effectiveness of biological shielding and the radiation environment and comparing data derived with calculated data. Using the Bilibino ATETs [nuclear heat and electric power station] and the Shevchenkovskaya AES and others as examples, the book examines construction specifics of various types of reactors (thermal and fast neutron), their biological shielding and shielding materials and radiation environment in the AES and sets forth the theory of calculation data were derived by the book's authors or in cooperation with other authors. The authors' material is published here for the first time.

The book is intended for engineering designers, operators, physicists, experimental physicists, post-graduates, students and all workers specializing in radiation shielding of nuclear power stations.

Figures 138. Tables 29. Bibliographical 232.

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ENGINEERING AND EQUIPMENT

Aeronautical and Space

USSR UDC 629.7.036.54-64

DETERMINATION OF DESIGN PARAMETERS AND SELECTION OF LAUNCH SAFEGUARD SYSTEM FOR A LIQUID-PROPELLANT SPACECRAFT THRUSTER

Moscow TRUDY CHETVERTYKH CHTENIY, POSVYASHCHENNYKH RAZRABOTKE NAUCHNOGO NASLEDIYA I RAZVITIYU IDEY F. A. TSANDERA. SEKTSIYA 'TEORIYA I KONSTUKTSIYA DVIGATELEY I LETATEL'NYKH APPARATOV' [Proceedings of the Fourth Readings Dedicated to Development of the Scientific Heritage and Elaboration of the Ideas of F. A. Tsander. Section on the Theory and Design of Engines and Flightcraft] in Russian 1978 pp 94-102

KALYAZIN, E. L.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1979 Abstract No 6.34.122]

[Text] Launch safeguard systems (LSS) can be divided into 3 separate types according to their operating principles: displacement, capillary, and inertial. In the displacement systems the gaseous and liquid phases in the tank are mechanically insulated from one another by means of metal membranes or flexible sacs and diaphragms. Capillary systems assure the orientation of the fluid in a specified area of the tank and its delivery to the turbine-driven pump unit by means of the forces of surface tension. Inertial LSS are based on auxiliary thrusters actuated prior to the launching of the liquid-propellant thruster and providing slight boosts for preparing the liquid components of the fuel for delivery to the main thruster. The performance of these systems is examined. Figures 2; references 3.
[448-1386]

1386
CSO: 1861

Nuclear Energy

USSR UDC 621.039.536.2(088.83)

HEADER-TYPE NUCLEAR RESEARCH REACTOR

USSR Author's Certificate Cl. G 21 C 1/20, No 550034 filed 27 Jun 74 published 16 Feb 78

BUREYEV, G. A., VOLKOV, YE. N., NESTERENKO, G. F., TEREKHOV, A. S., YERYKALOV, A. N., KAMINKER, D. M., KONOPLEV, K. A., PETROV, YU. V. and SOKOLOV, V. M.

[From REFERATIVNYY ZHURNAL, YADERNYYE REAKTORY No 6, 1979 Abstract No 6.50.123]

[Text] A header-type nuclear research reactor containing a pressurized light water-cooled core is proposed. The core is enclosed in a housing constructed, e.g., in the form of a tube consisting of two shells with a gap along which circulates the neutron absorber, and is enclosed in a ring-shaped heavy-water reflector vessel. To simplify the periodic assembling and disassembling of the housing, the core is designed in the form of an internal wall of the reflector vessel and is hermetically attached to its throat and bottom at sites outside the irradiation zone. The gap between the casing shells is shaped in accordance with the energy release.
[452-1386]

1386
CSO: 1861

USSR UDC 621.039.5.36.2(088.823)

HIGH PRESSURE VESSEL

USSR Author's Certificate Cl. E 04 H 7/20, G 21 C 13/00, No 607935 filed 30 Dec 76, published 25 Apr 78

KIRILLOV, A. P. and GAUSTOV, K. Z., Scientific Research Sector of the Institute Gidroproyekt imeni S. Ya. Zhuk

[From REFERATIVNYY ZHURNAL, YADERNYYE REAKTORY No 6, 1979 Abstract No 6.50. 126 P]

[Text] A high-pressure vessel of prestressed reinforced concrete, containing a vertical part with reinforcement elements, a bottom, and a lid, is proposed. To assure a stressed-strained state of the vertical part, that part is shaped like a hyperboloid of one sheet and the reinforcement rods are positioned outside the vessel along its perimeter and their ends are fastened to the bottom and the lid.
[452-1386]

1386
CSO: 1861

Non-Nuclear Energy

USSR UDC 621.313.12:538.4

TRANSVERSE-CURRENT INHOMOGENEITY IN AN MHD CHANNEL AND ITS EFFECT ON LOCAL CHARACTERISTICS OF THE MHD GENERATOR

Moscow TEPLOFIZIKA VYSOKIKH TEMPERATUR in Russian Vol 17 No 1, 1979 pp 152-162

KIRILLOV, V. V.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 6, 1979 Abstract No 6.49.166]

[Text] The effect of transverse-current inhomogeneity on the characteristics of the MHD generator is considered for the case in which that inhomogeneity is due to the deviation of transverse current from the plasma flux onto the horizontal (insulating) walls of the MHD channel. This effect manifests itself most markedly in frame-type MHD channels, but it also affects considerably the characteristics of the MHD generator in the presence of a finite surface conductivity of the insulating walls. A rigorous analysis of the electrodynamics of the MHD channel with allowance for that effect leads to a three-dimensional problem whose exact solution is extremely difficult. An approximation method for the solution of that problem is proposed. On the basis of that method a simplified (engineering) procedure for the analysis of local electrical characteristics of the MHD generator is developed with allowance for the combined effect of the real factors inherent in MHD channels such as: inhomogeneity of velocity and conductivity in the boundary layers on the electrode walls and insulating walls; surface conductivity of the walls in the longitudinal and transverse directions; and the cathodic drop of the potential. The MHD generator characteristics derived from the proximate analysis over a broad range of conditions are compared with experimental findings as well as with the results of a rigorous solution of the problem. The effect of surface conductivity of wall channels (non-ideality of insulation) on MHD generator characteristics in the presence of a marked inhomogeneity of plasma conductivity in the channel-wall boundary layers is analyzed.
[451-1386]

1386
CSO: 1861

USSR UDC 538.3:538.4:621.362

DISTRIBUTION OF ELECTRICAL FIELDS AND CURRENTS IN A FRAME-TYPE MHD CHANNEL IN THE MAGNETIC FIELD SURGE ZONE

Moscow TEPLOFIZIKA VYSOKIKH TEMPERATUR in Russian Vol 17 No 1, 1979 pp 179-184

KRUTILIN, V. A. and RASHCHENKIN, A. P.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 6, 1979 Abstract No 6.49.164]

[Text] An approximate solution of the problem is used as the basis for investigating the effect of magnetic field inhomogeneity in the end zones of the frame-type MHD channel with a fixed frame tilt on the performance of a series-type MHD generator. Figures 4; references 6.
[451-1386]

1386
CSO: 1861

USSR UDC 621.039.6(088.83)

PUMPING UNIT OF A TWIN-CHAMBER PLASMA FACILITY

USSR Author's Certificate Cl. G 21 B 1/00, H 05 H 1/00, No 546235, filed 11 Nov 75, published 17 Nov 77

IZOTOV, YE. P., BOL'SHAKOVA, M. M. and GORDIN, A. A.

[From REFERATIVNYY ZHURNAL, YADERNYYE REAKTORY No 6, 1979 Abstract No 6.50.284 P]

[Text] A pumping unit for a 2-chamber plasma facility is proposed. The unit consists of a flange attached to the pumping branch of the inner chamber and passing in sealed form through an azimuthal opening in the vessel. To enhance the hermeticity of sealing the vessel, a fixed casing is installed in the azimuthal opening in the vessel and the pumping branch has the form of a coaxial bellows system whose inner bellows is attached to the inner chamber and outer bellows, to the face of the casins.
[452-1386]

1386
CSO: 1861

USSR UDC 629.7.036.3-226

ALGORITHM FOR COMPUTERIZED DESIGNING OF TECHNOLOGICAL SURFACES

Irkutsk MASHINNOYE PROYEKTIROVANIYE, UVYAZKA I VOSPROIZVEDENIYE SLOZHNYKH DETALEY V AVIASTROYENII [Machine Design, Coordination and Reproduction of Complex Parts in Aircraft Construction] in Russian 1978 pp 220-223

SHCHURANOVA, YE. N.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.46]

[Text] A blade design method based on Cremona space transforms stratified in a sheaf of planes into Hirst transforms is proposed. The analytical apparatus of geometrical transformations makes possible transition to computerized design of surfaces according to aerodynamic and strength parameters. Figures 2; references 2.
[447-1386]

1386
CSO: 1861

USSR UDC 621.039.52:621.428.001.5

INVESTIGATION OF THE SEPARATION CHARACTERISTICS OF A VERTICAL SEPARATOR MODEL WITH A BUILT-IN TURBOPUMP

Moscow SBORNIK TRUDOV. NAUCHNO-ISSLEDOVATEL'SKIY ENERGETICHESKIY INSTITUT IMENI G. M. KRZHIZHANOVSKOGO [Collected Papers. Scientific Research Power Engineering Institute imeni G. M. Krzhizhanovskiy] in Russian No 54, 1978 pp 93-104

KARASEV, V. B., AGEYEV, A. G., DUBROBSKIY, I. S., PROKLOV, V. B., BAYNYAKSHIN, V. D. and SAFONOV, V. K.

[From REFERATIVNYY ZHURNAL, YADERNYYE REAKTORY No 6, 1979 Abstract No 6.50.150]

[Text] The findings of an experimental investigation of a model of a vertical separator with a built-in turbopump, designed for use at stations with channel-type boiling reactors, are presented. The investigation was performed in the presence of natural parameters of the medium over a broad

range of load variations. The separation characteristics of the vertical separator are plotted, and the efficiency of performance of its components is assessed. The findings demonstrate the workability of the vertical separator model and are of interest to the further development and introduction of such separators as part of heat engineering facilities of atomic power stations. Figures 5; references 5.
[452-1386]

1386
CSO: 1861

USSR UDC 621.039.52:62-5(088.823)

ELECTROMAGNETIC STEP-BY-STEP LINEAR TRAVEL DRIVE

USSR Author's Certificate Cl. F 16 H 27/10, No 588429, filed 9 Jan 76, published 29 Jan 78

KAPRALOV, YE. I., VIKHOREV, YU. V., KIRILYUK, N. A. and STEKOL'NIKOV, V. V.

[From REFERATIVNYY ZHURNAL, YADERNYYE REAKTORY No 6, 1979 Abstract No 6.50.194 P]

[Text] An electromagnetic step-by-step linear travel drive is proposed. The device includes: a housing on which are mounted electromagnetic coils; a cylindrical rack inside the housing; stops installed in the housing and linked to ported bushings with the ports containing cams that turn in the diametral planes of the rack. These cams interact with the rack and are installed so as to assure the movement of plungers along the rack axis together with the connecting stop bushings interacting with the cams. To simplify the design of the drive and enhance its reliability of performance, the stop-bushing surfaces facing the cams are shaped to conform with the surfaces of the cams.
[452-1386]

1386
CSO: 1861

Turbine and Engine Design

USSR

UDC 621.438-71

INVESTIGATION OF DESIGN PECULIARITIES OF THE HEAT-STRESSED AND TEMPERATURE STATE OF THE HOUSING COMPONENTS OF A HIGH-POWER GAS TURBINE

Khar'kov ENERGETICHESKOYE MASHINOSTROYENIYE [Power-Producing Machinery] in Russian No 27, 1979 pp 79-83

LISETSKIY, N. L., POVOLOTSKIY, L. V., VANYUSHINA, T. M. and ZHEREZHONZAY-CHENKO, V. V.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 7, 1979 Abstract No 7.49.52]

[Text] The paper gives the results of a study of the heat-stressed and temperature state and the efficiency of the system for cooling the heated components of a gas turbine. Steps are worked out that are aimed at improving the operation of the cooling system and reducing temperature nonuniformities. Figures 3.
[446-6610]

6610
CSO: 1861

USSR

UDC 536.21

ACCOUNTING FOR NONLINEARITIES IN NUMERICAL MODELING OF HEAT CONDITIONS OF THE COMPONENTS OF POWER PLANTS

Khar'kov ENERGETICHESKOYE MASHINOSTROYENIYE [Power-Producing Machinery] in Russian No 27, 1979 pp 101-107

DYUDIN, A. YE., ZIATDINOV, I. S., KOZDOVA, L. A. and FIALKO, N. M.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 7, 1979 Abstract No 7.49.51]

[Text] A numerical investigation is made of a mathematical model of the nonlinear one-dimensional unsteady problem of heat conduction that may serve as a test for checking the reliability of the mathematical model of nonlinear problems under the action of highly concentrated heat sources. An analysis is made of the influence of the following factors: the difference scheme of the calculation (explicit, implicit), the method of accounting for

nonlinearity (iterative, noniterative), intervals of space and time. It is shown that linearization leads to considerable errors in the solution. Figure 1; tables 3; references 2.
[446-6610]

6610
CSO: 1861

USSR UDC 621.165:533.6.011

SOME PROSPECTS OF DEVELOPMENT OF HIGH-POWER STEAM TURBINES

Khar'kov ENERGETICHESKOYE MASHINOSTROYENIYE [Power-Producing Machinery] in Russian No 28, 1979 pp 12-15

GARKUSHA, A. V. and SUDARKINA, S. P.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 7, 1979 Abstract No 7.49.31]

[Text] One of the most promising directions for increasing the unit power of a turbine by increasing steam flowrate without an appreciable change in the size of the last stage is to organize multilevel exhaust, where a two-level Bauman stage is used as the prefinal. An examination is made of the technical and economic problems of increasing the unit power of turbine units in the process of manufacture and operation. The possibilities for using two-level stages in the low-pressure part of large steam turbines are determined. Figures 2; table 1.
[446-6610]

6610
CSO: 1861

USSR

UDC 533.697.5

INVESTIGATION OF THE PERFORMANCE OF A SLIT-[illegible] EJECTOR WITH A SUPERSONIC DIFFUSER

Kazan' GAZODINAMIKA DVIGATELEY LETATEL'NYKH APPARATOV [Gasdynamics of Flightcraft Engines] in Russian No 1, 1978 pp 86-89

KALMYKOV, I. I. and STRIZHKOV, A. G.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.134]

[Text] The performance of a slit-type ejectro with a supersonic diffuser of non-adjustable passage cross section is experimentally investigated. The length of the initial cylindrical sector of the diffuser is found to affect that performance markedly. The optimal length of that sector is found to be 6 diameters. The use of a supersonic diffuser in the slit-type ejector system serves to increase the compression ratio by 80-20% at n = 0.03±0.15, respectively, compared with a conventional ejector. Figures 3; references 4. [447-1386]

1386
CSO: 1861

USSR

UDC 621.396.677.6:532.527

EFFECT OF DESIGN PARAMETERS ON THE CHARACTERISTICS OF SWIRL-TYPE EJECTORS

Kazan' GAZODINAMIKA DVIGATELEY LETATEL'NYKH APPARATOV [Gasdynamics of Flightcraft Engines] in Russian No 1, 1978 pp 89-95

PANCHENKO, V. I., TOLSTUKHIN, R. N., VINOGRADOV, B. S. and MALKOV, G. V.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.133]

[Text] The paper gives the results of an experimental investigation of swirl-type ejectors with exhaust into the atmosphere, designed to pump gas through a fluidic oscillator that serves as a temperature measurement transducer at the inlet to a gas-turbine engine compressor. The optimal dimensional ratios of the swirl chamber, the mixing chamber, and the ejector

diffuser are determined. The operating range of active gas pressures is shown to be affected by the width of the diffuser slit load-limiting cross section in the ejected gas circuit. The findings on the ejection factor and the degree of increase in pressure of the ejected gas are presented. Figures 6; references 5.
[447-1386]

1386
CSO: 1861

USSR UDC 533.6.071

DESIGN OF AN ADIABATIC COMPRESSION DEVICE

Kazan' GAZODINAMIKA DVIGATELEY LETATEL'NYKH APPARATOV [Gasdynamics of Flightcraft Engines] in Russian No 1, 1978 pp 95-99

VINOGRADOV, B. S., BEREZOVSKIY, A. B., PANFILOVICH, V. B. and KISLIKOV, N. I.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.132]

[Text] A schematic diagram of an adiabatic compression device with a controller located in the "cold" part of the device is presented. It is shown that in this case it is possible to implement various patterns of piston movement during compression and various patterns of variation in total pressure in the nozzle prechamber during the flow of gas through the nozzle. Calculations demonstrating the effect of certain parameters during compression and discharge are performed. Figures 5.
[447-1386]

1386
CSO: 1861

USSR UDC 532.529:629.7.036.8

COMPARATIVE ANALYSIS OF BYPASS ENGINES AND GAS-HYDRAULIC JET POWER PLANTS ON FAST BOATS

Khar'kov GAZOTERMODINAMIKA MNOGOFAZNYKH POTOKOV V ENERGOUSTANOVKAKH [Gas Thermodynamics of Multiphase Flows in Power Plants] in Russian No 1, 1978 pp 29-37

SELIVANOV, V. G. and FROLOV, S. D.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 7, 1979 Abstract No 7.49.22 (résumé)]

[Text] An analysis is made of the technical and economic indices (specific thrust, specific fuel consumption, frontal thrust, etc.) attained in two versions of gas-turbine power plants on high-speed vessels with operation based on organization of direct energy exchange between compressed air and the surrounding water in a two-phase nozzle. In one of the versions of the power plant the available work of the gas-turbine cycle of the plant is fed to a compressor that pressurizes the air into the two-phase nozzle, and in the other design the surrounding water is fed to a two-phase nozzle installed in the second loop of a bypass engine. A comparison is made of the indices of these power plants and bypass engines and conditions are determined under which the indices of these plants are more effective. Figures 5; references 17.
[446-6610]

6610
CSO: 1863

USSR UDC 629.7.036.3(075.8)

GAS TURBINES OF FLIGHT VEHICLE ENGINES

Moscow GAZOVYYE TURBINY DVIGATELEY LETATEL'NYKH APPARATOV. TEORIYA, KONSTRUKTSIYA I RASHCHET. UCHEBNIK DLYA VTUZOV [Gas Turbines of Flightcraft Engines. Theory, Design, and Analysis. Textbook for Higher Technical Schools] in Russian, 3rd revised and expanded edition, Mashinostroyeniye 1979 447 pp

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.7 K]

[Text] This is a gas-turbine course textbook for higher technical schools of aviation. It is based on general scientific (mathematics, physics, etc.) and general engineering (mechanics, thermodynamics and heat transfer, strength of materials, parts of machinery, etc.) disciplines. The book discusses the theory and methods of analysis and design, and it reviews the gas turbines used in aviation and in liquid-propellant rockets as well as in auxiliary aviation power plants (turbostarters, power units, etc.). Figures.
[447-1386]

1386
CSO: 1861

USSR

UDC 621.565.11

BALANCING OF THE ROTORS OF COMPRESSORS AND TURBINES IN AIRCRAFT GAS TURBINE ENGINES DURING THEIR CONVERSION TO ON-GROUND USE

Kiev KHOLODIL'NAYA TEKHNIKA I TEKHNOLOGIYA in Russian No 28, 1979 pp 39-43

BONDAREV, I. T. and OSADCHENKO, V. S.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.45]

[Text] An analysis of the factors affecting the balance of the rotors of high-speed compressors and turbines, particularly those of aircraft gas-turbine engines, is presented. A balancing method which does not require special dynamic balancing facilities and assures a highly balanced state of the rotors is proposed and described. Figures 2; references 4.
[447-1386]

1386
CSO: 1861

USSR

UDC 621.438-233.2:536.2

METHODS FOR ANALYZING THE THERMAL REGIME OF GAS TURBINE ENGINE BEARINGS IN THE PRESENCE OF EXTERNAL HEATING

Kuybyshev KONTAKTNO-GIDRODINAMICHESKAYA TEORIYA SMAZKI I YEYE PRAKTICHESKOYE PRIMENENIYE V TEKHNIKE. MATERIALY VTOROY VSESOYUZNOY NAUCHNO-TEKHNICHESKOY KONFERENTSII [Contact-Hydrodynamic Theory of Lubrication and its Practical Application in Technology. Materials of the Second All-Union Scientific and Technical Conference] in Russian No 2, 1979 pp 31-38

DEMIDOVICH, V. M., KLYUSHKIN, A. P., CHERNOGLAZOV, V. A., ROSHCHIN, V. V. and TKACHEV, G. V.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 6, 1979 Abstr-ct No 6.49.135]

[Text] On the basis of theoretical research and experiments, a procedure for analyzing the thermal regime of externally heated gas turbine engine bearings was developed. Analytic formulas and comparisons with experimental findings are presented. Figures 3; references 2.
[451-1386]

1386
CSO: 1861

USSR UDC 621.822.6

EVALUATION OF THE PERFORMANCE CAPACITY OF THE PENDULUM BEARINGS OF HIGH TEMPERATURE GAS TURBINE ENGINES

Kuybyshev KONTAKTNO-GIDRODINAMICHESKAYA TEORIYA SMAZKI I YEYE PRAKTICHESKOYE PRIMENENIYE V TEKHNIKE MATERIALY VTOROY VSESOYUZNOY NAUCHNO-TEKHNICHESKOY KONFERENTSII [Contact-Hydrodynamic Theory of Lubrication and its Practical Application in Technology] in Russian No 2, 1978 pp 121-129

AKSENOV, N. K., MITIN, B. M. and UVAROV, V. N.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 6, 1979 Abstract No 6.49.137]

[Text] A method for estimating the heat balance components of the bearings of gas turbine engines is developed. The calculated total transfer of heat to the bearings is compared with the experimental findings on the increase in the heat content of the bearings. Figures 3; references 3.
[451-1386]

1386
CSO: 1861

USSR UDC 629.7.036.3:061

OPTIMIZATION TECHNIQUES IN THE DESIGN AND ADJUSTMENT OF AIRCRAFT GAS-TURBINE ENGINES

Moscow METODY OPTIMIZATSII PRI DOVODKE I PROYEKTIROVANII GAZOTURBINNYKH DVIGATELEY in Russian, Mashinostroyeniye 1979 184 pp

TUNAKOV, A. P.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1979 Abstract No 6.34.5 K]

[Text] Methods for optimizing the parameters of aircraft gas-turbine engines and their utilization in an automated design system are described. A universal mathematical model of a gas-turbine engine assuring multimodal optimization for various monitoring programs is presented. The book is designed for engineers dealing with the calculations, design, tests, and adjustment of gas-turbine engines. Figures.
[448-1386]

1386

CSO: 1861

USSR UDC 621.224.35(075)

INSTALLATION AND OPERATION OF SWIVEL-VANE WATER TURBINES

Moscow MONTAZH I EKSPLUATATSIYA POVOROTNO-LOPASTNYKH GIDROTURBIN in Russian Energiya 1979 200 pp

GAL'PERIN, M. I. and SHRIRO, I. I.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 7, 1979 Abstract No 7.49.172K]

[Text] The paper describes modern methods of installing swivel-vane turbines, and also considers repair problems. Considerable attention is given to questions of improving quality and increasing the reliability of water turbine equipment on all stages of design, manufacture, installation and use. The book is intended for engineers and technicians dealing with design, organization and production in construction and repair jobs, and also for operating and repair personnel in hydroelectric plants. It may also be of use to students majoring in the corresponding fields in institutions of intermediate and higher education.
[446-6610]

6610
CSO: 1861

USSR UDC 621.67.629.13

CERTAIN ASPECTS OF RELIABLE PERFORMANCE OF BALL BEARINGS AND PACKINGS OF CENTRIFUGAL PUMPS OF AIRCRAFT ENGINES

Dnepropetrovsk O NEKOTORYKH VOPROSAKH NADEZHNOY RABOTY SHARIKOPODSHIPNIKOV I UZLOV UPLOTNENIYA TSENTROBEZHNYKH NASOSOV AVIATSIONNYKH DVIGATELEY in Russian, Dnepropetrovsk University, 1978 9 pp (manuscript deposited at NIIMash 12 Feb 79 No 27-79)

GLADCHENKO, N. K.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.105 by author]

[Text] Problems of lubrication and cooling assuring a reliable performance of the ball bearings and cups of the centrifugal pumps of aircraft engines are considered. It is shown that the fuel circulation assuring the lubrication and cooling of the ball bearing and cup is not always provided for in the existing designs. It is experimentally established that the presence and direction of the circulation depend on the size of the clearance between the pump housing and the radial blades of the centrifugal pump, which clearance acts as a packing. References 3.
[447-1386]

1386
CSO: 1861

USSR UDC 621.438:533.6.011

AN APPROXIMATE TECHNIQUE FOR CALCULATING A MULTISTAGE TURBINE UNDER CONDITIONS THAT ARE FAR FROM THE DESIGN SPECIFICATIONS

Leningrad PRIBLIZHENNAYA METODIKA RASCHETA MNOGOSTUPENCHATOY TURBINY V OBLASTI GLUBOKONERASCHETNYKH REZHIMOV RABOTY in Russian, Institute of Railroad Transportation Engineers, 1979 (manuscript deposited in TsNIITEI, Ministry of Railroads, 12 Apr 79 No 911/79)

BUYANOV, A. B.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 7, 1979 Abstract No 7.49.18DEP by the author]

[Text] An approximate method is given for stage-by-stage calculation of a multistage turbine under conditions far removed from design specifications by using data on operation under nominal conditions and the parameters of the working fluid preceding the first stage for the mode to be calculated. In developing the method, use is made of mean statistical experimental data on the operation of turbine stages and turbines over a wide range of speeds and operating conditions, as well as the results of tests of turbine cascades done by the author. The paper gives analytical relations derived for the efficiency of a turbine stage [as a function] of the parameter $\kappa = u/c_0$, the flowrate of the working fluid and the isentropic heat transfer, which reflect the efficiency in the thrust and compressor modes in a unit coordinate system. Experimental data are given from tests of a two-stage turbine under conditions where the first stage is working in the thrust mode, and the second stage is working in the compressor mode. Comparisons are made of the calculated data (according to the proposed method) and the experimental data for this two-stage turbine.
[446-6610]

6610
CSO: 1861

USSR UDC 629.7.036.3.001

DESIGN AND ADJUSTMENT OF AIRCRAFT GAS-TURBINE ENGINES

Kuybyshev PROYEKTIROVANIYE I DOVODKA AVIATSIONNYKH GAZOTURBINNYKH DVIGATELEY. MEZHVUZ. SB. in Russian, Kuybyshev Aviation Institute 1978 135 pp

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1979 Abstract No 6.34.4 K]

[Text] This anthology is another in another in a series of collections with the same title published since 1970. It deals with methods of computing gas flow in the engine, design features of components and elements of blading, and improvements in the data and measurement systems. A number of articles are devoted to calculations of oscillatory processes and development of effective means of noise suppression. The material in this anthology may be useful to engineers in the design of aircraft engines as well as to students in higher schools of aviation engineering.
[448-1386]

1386
CSO: 1861

USSR UDC 629.7.036.3:002.2

REDUCING THE LABOR REQUIREMENT OF THE PRODUCTION OF MODERN GAS TURBINE ENGINES BY MODIFYING THEIR DESIGN DURING FINAL ADJUSTMENTS

Kubyshev PROYEKTIROVANIYE I DOVODKA AVIATSIONNYKH GAZOTURBINNYKH DVIGATELEY [Design and Adjustment of Aircraft Gas-Turbine Engines] in Russian 1978 pp 101-108

ISHUTIN, G. I.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1979 Abstract No 6.34.106]

[Text] The experience gained in reducing the labor requirement of the pilot production of gas turbine engines by optimizing the design of parts and components during their final adjustments is presented, as relating to particular stages of adjustments of various components of a specifid gas turbine

engine. The reasoning behind the reduction of the labor requirement of the construction of the first lot of gas turbine engines in series production is described. Figures 4; references 2.
[448-1386]

1386
CSO: 1861

USSR UDC 629.7.036.3:621.43.056

EFFECT THAT ARTIFICIAL TURBULENCE GENERATORS IN THE COOLING DUCTS OF AN ENGINE HAVE ON SPECIFIC PARAMETERS AND TECHNOLOGICAL PROPERTIES

Moscow TEMATICHESKIY SBORNIK NAUCHNYKH TRUDOV. MOSKOVSKIY AVIATSIONNY INSTITUT [Thematic Collection of Scientific Papers. Moscow Aviation Institute] in Russian No 470, 1979 pp 9-12

MYAKOCHIN, A. S. and DREYTSER, G. A.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.38]

[Text] To intensify heat transfer in the milled cooling channels of the interior shell of a combustion chamber, it is expedient to introduce artificial generators of turbulence of the coolant flow. Such generators are introduced in the form of baffles installed in the bottom of the cooling duct. The specific impulse of an engine with such an intensification of heat transfer in the combustion chamber is increased by 6% owing to a reduction in the flow rate of the suspension. Figures 2; references 4.
[447-1386]

1386
CSO: 1861

USSR UDC 629.7.036.54-64:629.7.063.3

THEORY AND DESIGN OF FUEL DELIVERY SYSTEMS FOR LIQUID-FUEL ROCKET ENGINES

Moscow TEORIYA I RASHCHET AGREGATOV PITANIYA ZHIDKOSTNYKH RAKETNYKH DVIGATELEY in Russian, 2nd revised and expanded edition, Mashinostroyeniye, 1979 344 pp

OVSYANNIKOV, B. V. and GOROVSKIY, B. I.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1979 Abstract No 6.34.125]

[Text] Information on the theory and hydraulic calculations of the pumps and turbines of turbine-driven pump units (TDPU) of liquid-propellant thrusters is presented, along with the principles of the general theory of vaned machinery. The basic working formulas for designing the through-flow part of pumps and turbines are given. The selection of the principal parameters of TDPU is substantiated and the operating conditions of TDPU are analyzed. The book is designed as a textbook for higher-school students taking advanced courses in aviation engineering.
[448-1386]

1386
CSO: 1861

USSR UDC 62.7.036.3-462

INVESTIGATION OF THE THERMAL STATE OF THE FUEL LINES OF AFTERBURNERS IN STEADY AND TRANSIENT OPERATING MODES OF GAS TURBINE ENGINES

Kuybyshev TEPLOFIZIKA I OPTIMIZATSIYA TEPLOVYKH PROTSESSOV [Heat Physics and Optimization of Heat Processes] in Russian No 4, 1978 pp 116-122

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1979 Abstract No 6.34.62]

[Text] A technique for the electrical simulation of the thermal state of the fuel delivery line of the afterburner in gas turbine engines operating in the steady mode is proposed. The findings of an experimental study of a treated fuel line in an engine operating both in transient and steady

modes are presented; these findings serve, together with the findings on electrical simulation, to determine the causes and conditions of the coking of the inner walls of fuel lines. Figures 4; reference 1.
[448-1386]

1386
CSO: 1861

USSR UDC 629.7.036-54-64:536.46

OPTIMAL PROGRAMMED CONTROL OF ROCKET ENGINE PROPELLANT INGREDIENT RATIO

Moscow TRUDY CHETVERTYKH CHTENIY, POSVYASHCHENNYKH RAZRABOTKE NAUCHNOGO NASLEDIYA I RAZVITIYU IDEY F. A. TSANDERA. SEKTSIYA 'TEORIYA I KONSTRUKTSIYA DVIGATELEY I LETATEL'NYKH APPARATOV' [Proceedings of the Fourth Readings Dedicated to Development of the Scientific Heritage and Elaboration of the Ideas of F. A. Tsander. Section on the Theory and Design of Engines and Flightcraft] in Russian 1978 pp 83-88

PERELYGIN, B. P. and PISKAREVA, N. B.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 4, 1979 Abstract No 6.34.123]

[Text] Tsiolkovsky's formula is used as the point of departure for solving the problem of determining the optimal rocket propellant ingredient ratio controller action serving to maximize the ultimate rocket velocity and the efficiency of utilization of the propellant. In the presence of a variable discharge rate the concept of thrust efficiency may serve as an analogue of range-averaged efficiency.
[448-1386]

1386
CSO: 1861

USSR UDC 621.438-233.2-71(088.83)

REDUCING STARTING IMPACT LOADS OF MARINE GAS-TURBINE ENGINES BY UPDATING THE CLUTCH

Nikolayev TRUDY NKI [Proceedings of Nikolayev Shipbuilding Institute imeni S. O. Makarov] in Russian No 141, 1978 pp 54-60

PODGURENKO, V. S.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 7, 1979 Abstract No 7.49.141]

[Text] An examination is made of causes for breakage under actual working conditions of the components of the axial free-wheeling ratchet clutch used as the coupling mechanism in starting marine gas-turbine engines. Proposed modernization of the clutch has increased the reserve of operational reliability of the drive components, and has enabled startup of gas-turbine engines in any range of runner speeds. Figures 4; references 5. [446-6610]

6610
CSO: 1861

USSR UDC 629.7.036.3:536

FEATURES OF THE THERMAL CALCULATIONS OF A HYDROGEN-FUELED TURBOJET ENGINE

Ufa VOPROSY TEORII I RASCHETA RABOCHIKH PROTSESSOV TEPLOVYKH DVIGATELEY [Problems of Theory and Design of Heat Engine Processes] in Russian No 2, 1978 pp 85-90

AKSEL'ROD, S. YE. and SENDEROVICH, M. B.

[From REFERATIVNYY ZHURANL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1979 Abstract No 6.34.7]

[Text] A method for computing the relative hydrogen consumption rate with respect to a specified preheating of the combustion chamber is presented, and working formulas for determining the required values of $nT = f(T)$ are derived. The values of heat capacity $C_{pz}(T)$ and adiabatic index $K_{rz}(T)$ required for computing the expansion process are determined and the temperature

dependences of C_{pz} and K_z are computed with respect to different α of the hydrogen-air mixture in the combustion chamber. The course of the nT(T), C_{p_z} (α,T) dependences for hydrogen and for kerosene is compared. A comparative sample, calculation 3 of the thermodynamics of kerosene- and hydrogen-fueled turbojet engines is presented. Figures 4; references 3.
[448-1386]

1386
CSO: 1861

USSR UDC 621.438-762(088.825)

A NON-CONTACT SEAL FOR THE RADIAL CLEARANCE OF A TURBOMACHINE

USSR AUTHOR'S CERTIFICATE No 603755 filed 1 Mar 77 published 29 Mar 78

BOVA, YU. T. and DMITRENKO, A. I.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 7, 1979 Abstract No 7.49.137P]

[Text] A non-contact seal is proposed for the diaphragms of cooled gas turbines. The device contains a sealing element on the inner surface of the housing, and opposing annular projections on the runner. To improve effectiveness by reducing the radial clearance, and to increase operating reliability, there is at least one transverse recess on the periphery of each projection. This recess is formed by a tangentially situated platform and an adjacent step that is oriented in the direction of rotation of the runner. The recesses on adjacent projections are displaced in the circumferential direction. Figures 3.
[446-6610]

6610
CSO: 1861

USSR UDC 629.7.036.34(088.8)

FAN IMPELLER

USSR Author's Certificate Cl. F 04 D 29/36, No 606011, filed 20 Dec 76 published 8 Apr 78

KUZ'MICHEV, N. P., KUZNETSOV, YU. N., PODDUBSKIY, V. A., SUKHOROSOV, YU. L., USTINOV, V. P. and FILIPPOV, A. I.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.123 P]

[Text] This patent is issued for a fan impeller designed chiefly for ducted-fan turbine engines. It contains adjustable vanes installed in the wheel rim, in bearings whose cavities connect to an oil feed line provided with a return valve, as well as to a bleed line. To improve reliability of performance by intensifying the lubrication of the bearings, the valve is installed in the wheel to one side of the vane, with its seat facing the peripheral part of the wheel, while the bleed line is equipped with an extra return valve which is located on the other side of the vane and whose seat faces the wheel axis. Figures 2.
[447-1386]

1386
CSO: 1861

USSR

UDC 621.224-2(088.825)

A HYDROTURBINE MOTOR OF AXIAL TYPE

USSR AUTHOR'S CERTIFICATE No 611029 filed 24 Nov 72 published 12 May 78

KRYLOV, N. I., ROZANOV, B. V., RYMARENKO, L. I., DVORKIN, E. G., ZHUCHIN, V. N., GORSHKOV, B. T., ZHABIN, I. YA., SENATOROV, V. I. and SHIMANSKIY, V. P.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 7, 1979 Abstract No 7.49.170P]

[Text] A hydroturbine engine of axial type is known that is set on the horizontal shaft of the driven mechanism and contains a housing with two turbine flow sections symmetrically opposed along the shaft axis with inlet and outlet distribution chambers between them. A disadvantage of known engines is their low efficiency due to losses in the inlet chamber, and also the large dimensions that get in the way of the zone of action of the driven mechanism. To increase the power and reduce the size of the hydroturbine engine, the input chamber is equipped with a flow guide, and the input and output chambers are shifted accentrically relative to the shaft toward an increase in the zone of action of the driven mechanism. Figure 1. [446-6610]

6610
CSO: 1861

USSR

UDC 621.165-222.1(088.825)

A STEAM TURBINE HOUSING

USSR AUTHOR'S CERTIFICATE No 620640 filed 11 Feb 76, published 18 Jul 78

VOL'FSON, A. S. and RABINOVICH, E. M.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 7, 1979 Abstract No 7.49.76P]

[Text] A steam turbine housing is proposed with horizontally separable flanges and an inside cross section in the form of an ellipse with vertical diameter greater than the horizontal diameter and walls decreasing in thickness from the flange toward the vertical axis. To increase the tightness of the horizontal coupling, the difference between the maximum and minimum

thicknesses of the wall is 40-60% of the difference between the vertical and horizontal diameters of the cross section of the housing, which in turn is 70-90% of the difference between the width of the flange and the minimum thickness of the wall. Figure 1.
[446-6610]

6610
CSO: 1861

USSR UDC 621.515-233.2(088.825)

TURBOMACHINE THRUST BEARING

USSR AUTHOR'S CERTIFICATE No 620641 filed 16 Jun 76 published 17 Jul 78

YURCHENKO, I. S., GERASIMOV, B. YA., ZAKHAROVA, L. A. and KOSAROTOV, B. F., Neva Machine Building Plant imeni V. I. Lenin, Central Scientific Research, Design and Planning Institute of Boilers and Turbines

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 7, 1979 Abstract No 7.49.139P]

[Text] A thrust bearing is proposed for a turbomachine with cantilevered runner. The bearing contains a shaft with a bearing socket. To both sides of the socket, on split-ring liners, are shoe segments with tubes that have channels for feeding oil to the shoes. To increase the supporting capacity of the bearing, cavities are made in the split rings, these cavities being joined by a T-pipe that is connected to a high-pressure oil source. The cavities are connected by the channels of the tubes, which are made with annular recesses and are fastened securely in the split rings, and are fastened in the shoes by elastic rings placed in the annular recesses. Figures 2.
[446-6610]

6610
CSO: 1861

USSR UDC 621.165-251

A WELDED STEAM TURBINE RUNNER

USSR AUTHOR'S CERTIFICATE No 634880 filed 3 Jun 77 published 30 Nov 78

GERMAN, S. I., RUDKOVSKIY, A. F., UGOL'NIKOV, V. V., KOSYAK, YU. F., YEROKHIN, V. I., NIKOL'SKIY, S. F., RUDNEV, V. I., PATON, B. YE., KASATKIN, B. S., ZOREV, N. N., YAROVINSKIY, L. M. and DNEPROVSKIY, G. V., All-Union Technological Design Institute of Heavy Machinery, Khar'kov Turbine Plant imeni S. M. Kirov

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 7, 1979 Abstract No 7.49.73P]

[Text] A welded steam turbine rotor is proposed that contains disks with rims and adjustable centering belts. A U-shaped dressing is made in the disks, and an annulus is made between the centering belt and the root zone of the weld. The runner is distinguished by the fact that a shielding gas is blown in from the back side of the seam and single-pass welding is used to improve quality and increase productivity. An insert of less ductile material than that of the disks with stepwise dressing is placed in the root part of the U-shaped dressing. The lower projections of the stepwise dressing have a width of 1.5-2 diameters of the electrode, and a height equal to 1.0-1.5 widths, and a channel is made in the rim of each disk that is connected to the annulus for feeding in the shielding gas. Figures 2. [446-6610]

6610
CSO: 1861

USSR UDC 621.438-226.2(088.825)

COOLED DIAPHRAGM OF A TURBOMACHINE

USSR AUTHOR'S CERTIFICATE No 635266 filed 18 Jul 74 published 30 Nov 78

BOGORADOVSKIY, G. I., KURDIN, A. A., KRINSKIY, A. A. and KUZNETSOV, A. L., Nevskiy Zavod Production Association imeni V. I. Lenin

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 7, 1979 Abstract No 7.49.135P]

[Text] This patent proposes a cooled diaphragm for a turbomachine such as a steam turbine. In the cylindrical housing of the device is an annular collector communicating with channels for supply of the coolant and transfer to the turbine components. To reduce manufacturing labor inputs, the channels are made in the form of holes uniformly drilled around a circle, the offtakes being plugged on the supply side, while the feeders are located between them and are plugged from the opposite side. Figures 3. [446-6610]

6610
CSO: 1861

USSR UDC 621.165-333(088.825)

A CHECK VALVE

USSR AUTHOR'S CERTIFICATE No 635336 filed 1 Apr 77 published 30 Nov 78

TILLIB, V. N., CHULKOV, A. M. and BEL'FERMAN, M. D., All-Union Heat Engineering Institute

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 7, 1979 Abstract No 7.49.85P]

[Text] A check valve is proposed for devices to protect steam turbines from the backflow of steam from the regenerative system. The valve contains a closing component fastened to one end of a flexible element with the other end fixed to the housing. The closing component interacts with the saddle. The flexible element is made in the form of a block of two concentrically placed helical springs. One spring is held in the compressed position with the coils touching, while the other is a tension spring with present tension

exceeding the weight of the closing component and the reaction of the first spring. Steam from the turbine is admitted to the housing through a branch pipe with the saddle fastened to the face. A stop limits the open position of the closing component. If the steam flow through the branch pipe is not uniform, possible misalignments of the closing component are prevented by installing on two or more flexible elements. Figures 2.
[446-6610]

6610
CSO: 1861

Navigation and Guidance Systems

USSR UDC 533.6.697:629.7.062.2

PARAMETERS FOR EVALUATING THE PERFORMANCE OF DIRECTIONAL THRUST VECTORS

Kazan' GAZODINAMIKA DVIGATELEY LETATEL'NYKH APPARATOV [Gasdynamics of Flightcraft Engines] in Russian No 1, 1978 pp 37-46

VINOGRADOV, B. S.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.80]

[Text] On the basis of an analysis of the parameters used for an overall evaluation of the performance of the directional thrust vector controls installed in exhaust cone assemblies as well as in the directional thrusters of flight vehicles, the most convenient and practical parameters are selected and listed. References 4.
[447-1386]

1386
CSO: 1861

USSR UDC 629.78.062.2

GYROSTABILIZERS FOR INERTIAL CONTROL SYSTEMS

Leningrad GIROSTABILIZATORY INERTSIAL'NYKH SISTEM UPRAVLENIYA in Russian Izd-vo LGU, 1979 150 pp

SEVEROV, L. A.

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No 9, Sep 79 Abstract No 9.41.183 K]

[Text] The book deals with gyrostabilizers for uncorrectable inertial systems for controlling unnamed flightcraft. The main attention is paid to analysis and synthesis of the stabilizer platform structure. Kinematic and dynamic descriptions are given of gyrostabilizers with the platform variously suspended in a universal joint, with various arrangements of the gyros and the stabilizing motors. The problem of analytically designing practically feasible optimal regulators of gyrostabilizers is formulated and

solved. The possibility of realizing a high gain in the stabilization loop is analyzed from the standpoint of structural conditions for stability of a multidimensional linear system as well as from the standpoint of absolute stability of a system with standard nonlinear components. The book has been written for specialists dealing with the design of gyrostabilizers, it can also be useful to undergraduate and graduate students majoring in related fields.
[453-2415]

2415
CSO: 1861

USSR UDC 629.7.016.7

METHODOLOGICAL ASPECTS OF EXPERIMENTAL RESEARCH INTO THE EFFECTIVENESS OF THRUST VECTOR CONTROL ACTUATION SYSTEM COMPONENTS

Ufa VOPROSY TEORII I RASCHETA RABOCHIKH PROTSESSOV TEPLOVYKH DVIGATELEY [Problems of Theory and Design of Heat Engine Processes] in Russian No 2, 1978 pp 91-104

VINOGRADOV, B. S., SHAYKHUTDINOV, Z. G., LAZAREV, G. P., LIKHOVSKIKH, V. A., RUSAK, A. M. and RUBTSOV, V. B.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1979 Abstract No 6.34.117]

[Text] Experimental techniques and design principles of experimental equipment developed at the Ufa and Kazan' aviation institutes and subjected to lengthy operating-trial adjustments are examined. Figures 7; references 3.
[448-1386]

1386
CSO: 1861

USSR UDC 629.7.06.2:519.34

NUMERICAL SOLUTION OF THE PROBLEM OF MINIMIZING THE TOTAL IMPULSE OF A SINGLE-CHANNEL ANGULAR SPACECRAFT STABILIZATION SYSTEM WITH RESPECT TO A SPECIFIED ACCURACY

Ufa VOPROSY TEORII I RASCHETA RABOCHIKH PROTSESSOV TEPLOVYKH DVIGATELEY [Problems of the Theory and Design of Heat Engine Processes] in Russian No 2, 1978 pp 122-127

YARULLIN, CH. A.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1979 Abstract No 6.34.116]

[Text] A numerical solution of the problem of minimizing the impulse of a single-channel stabilization system with respect to a square-law quality criterion is examined. With the aid of L. S. Pontryagin's maximum principle the problem is reduced to a boundary-value problem and solved numerically. The block diagram of the computational procedure and sample calculations are presented. It is concluded from the calculational findings that upon HF reversal of the application of controlling force the ensuing form of the thrust impulse is unrealizable and there is a need for converting the impulse to a realizable form on the basis of the conditions of equality of the integral characteristics of the computed and converted momentum. Figures 3; references 3.
[448-1386]

1386
CSO: 1861

USSR UDC 629.78.015:533.1

AERODYNAMICS OF HYPERSONIC FLOWS WITH INJECTION

Moscow AERODINAMIKA GIPERZVUKOVYKH TECHENIY PRI NAILICHII VDUVA in Russian, Moscow State University 1979 236 pp

TIRSKIY, G. A.

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No 9, Sep 79 Abstract No 9.41.125 K]

[Text] The collection of articles covers a theoretical study of problems pertaining to hypersonic aerodynamics, specifically laminar and turbulent boundary layers as well as shock layers, with intensive injection due to thermochemical breakdown of the streamlined surface under convective and radiative heating. It should be of interest to scientists, graduate students and engineers working on these problems, also to researchers dealing with physical theories of meteoric phenomena.
[453-2415]

2415
CSO: 1861

USSR UDC 629.78.015:533.1

ASYMPTOTIC INTEGRATION OF EQUATIONS DESCRIBING A MULTICOMPONENT BOUNDARY LAYER CHEMICALLY NOT AT EQUILIBRIUM

Moscow AERODINAMIKA GIPERZVUKOVYKH TECHENIY PRI NALICHII VDUVA [Aerodynamics of Hypersonic Flows with Injection, Collection of Articles] in Russian Izd-vo MGU, 1979 pp 6-39

SUSLOV, O. N.

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No 9, Sep 79 Abstract No 9.41.126]

[Text] An analytical solution is obtained, by asymptotic methods, to the equations of a laminar multicomponent boundary layer chemically not at equilibrium and with partial ionization of the gas at a thermochemically dissociating surface. A distinguishing feature of this asymptotic problem

is that an asymptotic solution yields accurate results for the characteristic Schmidt number and Prandtl number as high as of the order of unity, i.e., within their practical ranges. With the aid of this asymptotic solution, moreover, the problem of determining the rate of thermochemical breakdown as well as the surface temperature and the composition of the surface material has been reduced to solving a system of nonlinear algebraic equations. Expressions for concentration and temperature prifles are derived. Expressions are also derived for the convective thermal flux toward a wall with a finite degree of catalyticity and to a wall with ideal catalytic properties, taking into account simultaneous injection of several different gases into the boundary layer. References 10.
[453-2415]

2415
CSO: 1861

USSR

UDC 629.78.015:533.1

NUMERICAL SOLUTION OF NAVIER-STOKES EQUATIONS FOR THE VICINITY OF BLUNTED BODY SURFACES IN A HYPERSONIC STREAM OF RAREFIED GAS WITH INJECTION

Moscow AERODINAMIKA GIPERZVUKOVYKH TECHENIY PRI NALICHII VDUVA [Aerodynamics of Hypersonic Flows with Injection, Collection of Articles] in Russian Izd-vo MGU 1979 pp 69-77

GERSHBEYN, E. A. and KOLESNIKOV, A. F.

[From REFERATIVNYY ZHURNAL, RAKETOSTROYENIYE No 9, Sep 79 Abstract No 9.41.128]

[Text] Problems of streamlining at low and moderate values of the Reynolds number are considered in terms of solution of Navier-Stokes equations and equations of a viscous shock layer. An economical difference scheme of fourth-order accuracy with respect to the transverse coordinate is constructed for solving the Navier-Stokes equations and, on the basis of these equations, results are obtained with regard to flow around bodies in a viscous gas with injection. Figures 13; references 19.
[453-2415]

2415
CSO: 1861

USSR UDC 629.78.015:533.6

SOLVING THE EQUATIONS OF HYPERSONIC VISCOUS SHOCK LAYER WITH SLIDING ALONG THE SURFACE BY A METHOD OF SUCCESSIVE APPROXIMATIONS

Moscow AERODINAMIKA GIPERZVUKOVYKH TECHENIY PRI NALICHII VDUVA [Aerodynamics of Hypersonic Flows with Injection, Collection of Articles] in Russian Izd-vo MGU, 1979 pp 99-110

BRYKINA, I. G.

[From REFERATIVNYY ZHURNAL: RAKETOSTROYENIYE No 9, Sep 79 Abstract No 9.41.129]

[Text] A method of successive approximations (one proposed earlier for solving the equations of a boundary layer) is extended to the equations of a hypersonic shock layer, with sliding at the surface and on the shock wave taken into account. The solution in the first approximation for arbitrary smooth bodies, expressed in an analytical form, is found to be quite accurate. Figures 4; tables 2; references 11.
[453-2415]

2415
CSO: 1861

USSR UDC 629.78.015:533.1

THREE-DIMENSIONAL HYPERSONIC VISCOUS SHOCK LAYER IN A HOMOGENEOUS GAS WITH INJECTION

Moscow AERODINAMIKA GIPERZVUKOVYKH TECHENIY PRI NALICHII VDUVA [Aerodynamics of Hypersonic Flows with Injection, Collection of Articles] in Russian Izd-vo MGU, 1979 pp 111-120

GERSHEYN, E. A. and YUNITSKIY, S. A.

[From REFERATIVNYY ZHURNAL: RAKETOSTROYENIYE No 9, Sep 79 Abstract No 9.41.130]

[Text] A numerical solution to the problem of a critical point in space is obtained on the basis of the equations of a hypersonic viscous shock layer, over a wide ranges of the Reynolds number and of the injection paramater. Figures 4; references 29.
[453-2415]

2415
CSO: 1861

USSR UDC 629.78.015:536.422

RADIATIVE HEATING OF BLUNTED AXISYMMETRIC BODIES WITH INTENSIVELY VAPORIZING SURFACES UPON ENTRY INTO THE JOVIAN ATMOSPHERE

Moscow AERODINAMIKA GIPERZVUKOVYKH TECHENIY PRI NALICHII VDUVA [Aerodynamics of Hypersonic Flows with Injection, Collection of Articles] in Russian Izd-vo MGU, 1979 pp 121-138

GERSHBEYN, E. A., SUKHODOL'SKAYA, E. YA., SUKHODOL'SKIY, S. L. and TIRSKIY, G. A.

[From REFERATIVNYY ZHURNAL: RAKETOSTROYENIYE No 9, Sep 79 Abstract No 9.41.131]

[Text] A simple iterative inverse method is proposed for solving the equations of radiation gas dynamics covering the entire shock layer at an arbitrary body surface with injection from the latter. This method is subsequently applied to the problem of flow around a body with an intensively vaporizing surface in a stream of a gaseous hydrogen-helium mixture simulating the Jovian atmosphere. Figures 14; references 44.
[453-2415]

2415
CSO: 1861

USSR UDC 629.78.015:533.1

THREE-DIMENSIONAL HYPERSONIC FLOW AROUND BLUNTED BODIES IN AN INVISCID GAS WITH INJECTION

Moscow AERODINAMIKA GIPERZVUKOVYKH TECHENIY PRI NALICHII VDUVA [Aerodynamics of Hypersonic Flows with Injection, Collection of Articles] in Russian Izd-vo MGU, 1979 pp 139-147

GERSHBEYN, E. A. and CHUPPIN, V. M.

[From REFERATIVNYY ZHURNAL: RAKETOSTROYENIYE No 9, Sep 79 Abstract No 9.41.132]

[Text] Three-dimensional hypersonic flow around smooth bodies in an ideal gas with intensive injection from their surfaces is analyzed asymptotically. Figures 5; references 21.
[453-2415]

2415
CSO: 1861

USSR UDC 629.78.015:533.1

HYPERSONIC FLOW AROUND A BLUNTED AXISYMMETRIC BODY IN RADIATING HYDROGEN IN THE STATE OF NONEQUILIBRIUM IONIZATION

Moscow AERODINAMIKA GIPERZVUKOVYKH TECHENIY PRI NALICHII VDUVA [Aerodynamics of Hypersonic Flow with Injection, Collection of Articles] in Russian Izd-vo MGU, 1979 pp 148-159

PILYUGIN, N. N. and CHUKHROV, A. YU.

[From REFERATIVNYY ZHURNAL: RAKETOSTROYENIYE No 9, Sep 79 Abstract No 9.41.133]

[Text] The study deals with hypersonic flow around a blunted body in hydrogen which is in a state of nonequilibrium ionization and which transmits radiation. Numerical calculations on the basis of the hypersonic approximation and a local self-similarity are performed for a spherical body. The dependence of the flow pattern within a compression shock layer on the parameters of the oncoming gas stream is also examined. The magnitude and the distribution of radiant flux are, furthermore, shown to be quite different in the case of nonequilibrium ionization than in the case of equilibrium ionization. Figures 6; tables 1; references 17.
[453-2415]

2415
CSO: 1861

USSR UDC 629.78.015:536.422

SHAPE OF A THIN BODY WITH A SURFACE RECEIVING THE MINIMUM THERMAL RADIATION FLUX UNDER VARIOUS ISOPERIMETRIC CONDITIONS

Moscow AERODINAMIKA GIPERZVUKOVYKH TECHENIY PRI NALICHII VDUVA [Aerodynamics of Hypersonic Flow with Injection, Collection of Articles] in Russian Izd-vo MGU, 1979 pp 160-166

DEYEV, A. A., LEVIN, V. A. and PILYUGIN, N. N.

[From REFERATIVNYY ZHURNAL: RAKETOSTROYENIYE No 9, Sep 79 Abstract No 9.41.134]

[Text] The variational problem is considered of determining the shape of an axisymmetric body with the minimum total thermal radiation flux impinging on its lateral surface in a stream. It is demonstrated that in several typical cases such optimal shaping of a body will greatly reduce the total radiation flux impinging on it. Figures 2; references 9.
[453-2415]

2415
CSO: 1861

USSR UDC 629.78.015:533.1

ITERATIVE METHOD OF SOLVING BOUNDARY-VALUE PROBLEMS WITH SINGULAR PERTURBATIONS IN THE THEORY OF AN ELECTRIC PROBE INSIDE A DENSE PLASMA

Moscow AERODINAMIKA GIPERZVUKOVYKH TECHENIY PRI NALICHII VDUVA [Aerodynamics of Hypersonic Flow with Injection, Collection of Articles] in Russian Izd-vo MGU, 1979 pp 174-180

BENILOV, M. S.

[From REFERATIVNYY ZHURNAL: RAKETOSTROYENIYE No 9, Sep 79 Abstract No 9.41.136]

[Text] Analytical expressions are derived for the current-voltage characteristic of a spherical probe in a hypersonic stream of a weakly ionized gas, whereupon an original efficient iterative method is proposed for numerical solution of boundary-value problems with singular perturbations in the theory of a Langmuir probe. Figures 3; references 10.
[453-2415]

2415
CSO: 1861

USSR UDC 629.78.015:536.422

THERMOCHEMICAL BREAKDOWN OF BODIES IN A HYPERSONIC GAS STREAM

Novosibirsk CHISLENNYYE METODY MEKHANIKI SPLOSHNOY SREDY in Russian Vol 10 No 3, 1979 pp 15-19

BERTSUN, V. N., GRISHIN, A. M. and ISMAILOV, N. G.

[From REFERATIVNYY ZHURNAL: RAKETOSTROYENIYE No 9, Sep 79 Abstract No 9.41.138]

[Text] A body made of carbon-graphite moving through the atmosphere at hypersonic velocity is considered and the problem of its thermochemical breakdown is solved numerically. Figures 5; references 9. [453-2415]

2415
CSO: 1861

USSR UDC 629.78.015:533.6.011.5

NUMERICAL ANALYSIS OF THE FLOW PATTERN AROUND BODIES OF FINITE DIMENSIONS MOVING AT SUPERSONIC VELOCITIES

Novosibirsk CHISLENNYYE METODY MEKHANIKI SPLOSHNOY SREDY in Russian Vol 9 No 7, 1978 pp 79-92

PASKONOV, V. M.

[From REFERATIVNYY ZHURNAL: RAKETOSTROYENIYE No 6, Jun 79 Abstract No 6.41.88]

[Text] Axisymmetric laminar supersonic flow of a viscous perfect gas around various bodies of finite dimensions and with a blunt frontal surface is analyzed numerically. The methodology of obtaining numerical solutions to boundary-value problems is examined relative to Navier-Stokes equations for extensive flow regions. Much attention is paid to the description of flow patterns in the wake behind bodies of simple shapes (spherically blunted cylinder and cone). Possibilities of altering the flow pattern between two coaxial cylinders some distance apart, one behind the other, in a supersonic oncoming stream are also considered. A change in the flow pattern as a

result of nonsteady inrush from the stern of the leading cylinder is demonstrated. An analysis of all these problems poses heavy demands on the methodology of calculations and adds new requirements for further improving numerical methods, algorithms, programs, and the entire system of numerical experiments. Figures 15; references 7.
[454-2415]

2415
CSO: 1861

USSR

UDC 629.7.036.3:533.697.4

CALCULATIONS OF SUBSONIC AND SUPERSONIC FLOW IN PLUG NOZZLES OF COMPLEX CONFIGURATION WITH CURVATURE OF FLOW

Moscow CHISLENNYYE METODY V AERODINAMIKE [Numerical Methods in Aerodynamics] in Russian No 3, 1978 pp 3-25

OVSYANNIKOV, A. M.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1979 Abstract No 6.34.47]

[Text] A generalization of the method of computing mixed flow in plug nozzles of complex configuration is presented. The possibilities of that generalization are demonstrated by the numerical calculation of flow in plug nozzles of complex configuration with curvature of flow through 90 and 180°, as well as in helical channels. Figures 5; references 18.
[448-1386]

1386
CSO: 1861

USSR UDC 621.125:536.2

SOLUTION OF THE SYMMETRIC PROBLEM OF HEAT CONDUCTIVITY FOR A BALL

Khar'kov ENERGETICHESKOYE MASHINOSTROYENIYE [Power-Producing Machinery] in Russian No 27, 1979 pp 65-67

KHRESTOVOY, YU. L., PALEY, V. A. and MEDVEDEVA, T. I.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 7, 1979 Abstract No 7.49.50]

[Text] A solution is found for the problem of heat conduction for a hollow ball (symmetric problem) with boundary conditions of the third kind, the temperatures of the medium being arbitrary functions of time; the solution is found by finite Fourier transformation. The passage to the limit in the solution is transformed for a solid ball.
[446-6610]

6610
CSO: 1861

USSR UDC 533.6.011.5:532.525-181.4

METHOD FOR BOUNDARY LAYER ANALYSIS IN MICRONOZZLES

Kazan' GAZODINAMIKA DVIGATELEY LETATEL'NYKH APPARATOV [Gasdynamics of Flightcraft Engines] in Russian No 1, 1978 pp 3-12

NATALEVICH, A. S.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.79]

[Text] An approximation method for the analysis of the laminar and turbulent boundary layers in circular subsonic and supersonic micronozzles ($Re_{d\ cr} = 10^2-10^4$), with allowance for gas compressibility, is considered. It is based on the Karman integral ratio. The nozzle is partitioned into 4-5 sectors and the differential equations applying within each of these sectors are reduced to their linear counterparts and solved by a method of successive approximations. Figures 2; references 4.
[447-1386]

1386
CSO: 1861

USSR UDC 532.525.011.5

MAKING ALLOWANCE FOR THE BOUNDARY LAYER IN PLANE SUPERSONIC NOZZLES

Kazan' GAZODINAMIKA DVIGATELEY LETATEL'NYKH APPARATOV [Gasdynamics of Flightcraft Engines] in Russian No 1, 1978 pp 25-27

TIMONIN, V. A.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.157]

[Text] To compensate for the effect of viscosity with flow in a supersonic nozzle, the cross-sectional area is augmented by the thickness of boundary-layer displacement. The resulting contour broadening compared with the designed position is a function of the displacement thickness and the geometrical dimensions of the nozzle. The solution of laminar boundary layer equations for the nozzle is used to derive formulas serving to estimate the angle of flow descent as a function of the relative displacement thickness and the Mach number. References 3.
[447-1386]

1386
CSO: 1861

USSR UDC 536.423.4:(533.6.011.5+532.529)

CONDENSATION SHOCK IN AIR-STEAM MIXTURE

Kazan' GAZODINAMIKA DVIGATELEY LETATEL'NYKH APPARATOV [Gasdynamics of Flightcraft Engines] in Russian No 1, 1979 pp 27-31

MUKHACHEV, G. A. and ARSLANOVA, S. N.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.182]

[Text] An approximate method for determining the locus of the condensation shock with flow of an air-steam mixture in a Laval nozzle is proposed. The method represents a refinement of the Djarmati method as applied to the case of one-dimensional flow of an air-steam mixture. It is assumed that the

condensation shock arises in the cross-sectional area in which the rates of variation in equilibrium and inequilibrium degrees of wetness are equal. A formula for the rate of variation of the equilibrium degree of wetness at condensation of the air-steam mixture is derived. The rate of variation in the inequilibrium degree of wetness was determined with the aid of the Frenkel-Zel'dovich equation for the generation rate of condensation nuclei, jointly with the Knudsen formula. Analysis of the flow of moist air of atmospheric parameters in flat Laval nozzles showed satisfactory agreement with experiment. References 5.
[447-1386]

1386
CSO: 1861

USSR UDC 533.697.3:533.6.011.5

STAGNATION OF SUPERSONIC FLOW IN RECTANGULAR CHANNELS

Kazan' GAZODINAMIKA DVIGATELEY LETATEL'NYKH APPARATOV [Gasdynamics of Flightcraft Engines] in Russian No 1, 1978 pp 31-37

KUZ'MIN, V. A.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.20]

[Text] The findings of an experimental study of gas flow in wide channels of uniform cross section in the presence of supersonic velocity at the inlet are presented. Static pressure distributions along the channels and visually observable flow patterns of filaments of oil along the walls are presented. The fact that the recovery of static pressure is markedly more limited than in a square channel is pointed out. Figures 2; references 9.
[447-1386]

1386
CSO: 1861

USSR UDC 532.526

ANGLE OF SEPARATION OF SUPERSONIC TURBULENT BOUNDARY LAYER IN THE PRESENCE OF TWO-DIMENSIONAL INTERACTION

Kazan'GAZODINAMIKA DVIGATELEY LETATEL'NYKH APPARATOV [Gasdynamics of Flight-craft Engines] in Russian No 1, 1978 pp 46-53

KRISHTAL', V. I. and PANCHENKO, V. I.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.19]

[Text] Certain findings of an experimental investigation of separation of a supersonic turbulent boundary layer with the M number range of 1.55+12.43 and Re number range of $(1.63+300)\cdot 10^6$, published in various studies, are collated. In the computational model of flow the decisive factor was taken to be turbulent mixing at the separating streamline. The angle of separation was found with allowance for back-flow and attachment of the detached boundary layer. Calculations of the angle of separation based on various dependences of the rate of increment in mixing layer thickness on the M number at the layer boundary are conducted. Figures 4; references 18. [447-1386]

1386
CSO: 1861

USSR UDC 533.517.4

INVESTIGATION OF FLOW IN THE REGION OF INTERACTION BETWEEN TRANSSONIC FLOW AND A CROSS-FLOW JET

Kazan' GAZODINAMIKA DVIGATELEY LETATEL'NYKH APPARATOV [Gasdynamics of Flightcraft Engines] in Russian No 1, 1978 pp 53-58

LEBEDEVA, L. N.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.77]

[Text] The findings of an experimental investigation of the interaction between a transsonic outer flow and a sonic cross-flow jet are presented. Three flow patterns in the interaction areas are considered, and the parameters influencing transition from one flow pattern to another are specified. The pressure distributions corresponding to these flow patterns are derived. Figures 4; references 5.
[447-1386]

1386
CSO: 1861

USSR UDC 532.525.2

EFFECT OF THE INJECTION OF FUEL INTO A GAS FLOW ON TOTAL HEAD LOSS

Kazan' GAZODINAMIKA DVIGATELEY LETATEL'NYKH APPARATOV [Gasdynamics of Flightcraft Engines] in Russian No 1, 1979 pp 65-71

RYS'YEV, V. I., GRUZDEV, V. N., TALANTOV, A. V. and MARCHUKOV, YU. P.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.24]

[Text] The results of an experimental and theoretical investigation of the loss of total head due to the injection of a jet of an evaporating fluid fuel into a gas flow are presented. These findings show that the delivery of the evaporating fuel in a quantity corresponding to α = 0.79-1.5 leads to an insignificant change in total head within the flow rate range λ = 0.24-0.33. If allowance is made for the initial momentum of the injected fluid, the loss of total head is higher. Figure 1.
[447-1386]

1386
CSO: 1861

USSR UDC 533.6.011

HYSTERESIS EFFECTS IN THROTTLE RESEARCH

Kazan' GAOZODINAMIKA DVIGATELEY LETATEL'NYKH APPARATOV [Gasdynamics of Flightcraft Engines] in Russian No 1, 1978 pp 71-76

SALAMASHKIN, V. A.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.107]

[Text] The findings of an experimental investigation of throttle devices with rotary-type proportioning components are presented. The discharge and moment characteristics derived in dynamic tests within the 1-6 Hz frequency range are described. On the basis of an analysis of the findings of various investigators, the probable pattern of formation of hysteresis effects in throttles of this type in the presence of a near-critical pressure drop is described. Figures 4; references 5.
[447-1386]

1386
CSO: 1861

USSR UDC 621.541.181.4

ENERGY LOSS IN THE BLADELESS NOZZLE OF A CENTRIFUGAL MICROTURBINE

Kazan' GAZODINAMIKA DVIGATELEY LETATEL'NYKH APPARATOV [Gasdynamics of Flightcraft Engines] in Russian No 1, 1978 pp 108-112

KLYENINA, A. D.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.35.59]

[Text] The findings of an experimental investigation of the combined effect of M and Re criteria on the flow rate coefficient ϕ_1, the coefficient of decrease in circulation rate $k_{c\ 1}$, and the discharge coefficient μ_1 in nozzles with various flow geometry are presented. An analysis of the above factors, serving to elucidate features of gas flow in bladelss nozzles, is given. Figures 4; references 3.
[447-1386]

1386
CSO: 1861

USSR UDC 536.7:538.4:532.529

CYCLES OF GAS-FLUID JET ENERGY CONVERTERS

Khar'kov GAZOTERMODINAMIKA MNOGOFAZNYKH POTOKOV V ENERGOUSTANOVKAKH [Gas-Thermodynamics of Multiphase Flows in Power Plants] in Russian No 1, 1978 pp 13-22

FROLOV, S. D.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.18]

[Text] The results of a thoeretical analysis of ideal cycles of gas-fluid jet energy converters and their possible combinations with the gas-turbine cycle are presented. The relationships between effectiveness criteria and cycle parameters are defined. It is shown that cycle combining can result in marked quantitative and qualitative changes in the effectiveness criteria compared with the original cycle of the thermal machine. Figures 4; references 4.
[447-1386]

1386
CSO: 1861

USSR UDC 629.78.015:533.6

SOME PECULIARITIES OF NONSTATIONARY SEPARATION FLOW ON NEEDLE-NOSED BODIES

Moscow IZVESTIYA AKADEMII NAUK SSSR: MEKHANIKA ZHIDKOSTI I GAZA in Russian No 1, 1979 pp 97-103

SHALAYEV, S. P.

[From REFERATIVNYY ZHURNAL: RAKETOSTROYENIYE No 6, Jun 79 Abstract No 6.41.89]

[Text] Experimental data are presented pertaining to flow fluctuations of the first and the second kinds at a needle in front of a conical shield. An analysis is made to explore how the dimensionless frequency of fluctuations of the first kind and how the location of the boundaries of nonstationary flow with fluctuations of both kinds depend on the dimensionless parameters. Figures 5; references 9.
[454-2415]

2415
CSO: 1861

USSR UDC 533.697

NECESSARY CONDITIONS OF OPTIMALITY OF A NOZZLE WHOSE PROFILE IS UNDER CONSTRAINTS EXPRESSED BY AN INEQUALITY

Tula NEOBKHODIMYYE USLOVIYA OPTIMAL'NOSTI SOPLA PRI NALOZHENIYU NA YEGO PROFIL' OGRANICHENIY V FORME NERAVENSTVA in Russian, Tula Polytechnic Institute, 1978 7 pp(manuscript deposited at VINITI [All-Union Institute of Scientific and Technical Information] 24 Apr 79 No 1506-79 Dep)

ULANOVA, T. D.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.98 DEP by the authors]

[Text] The problem of the optimization of a nozzle whose profile is under constraints expressed by an inequality is considered. The general method of Lagrange multipliers is used for the solution. Equations of gas dynamics are used as supplementary conditions. The necessary conditions of nozzle optimality are derived. It is established that the nozzle profile may consist of three types of sectors: zero-inclination sector, specified-inclination sector, and regularly shaped sector. Figures 2; references 3. [447-1386]

1386
CSO: 1861

USSR UDC 629.78.064.2

GAS FLUIDICS IN AERO-SPACE ROCKET SYSTEMS

Moscow PNEVMOAVTOMATIKA RAKETNO-KOSMICHESKIKH SISTEM in Russian Izd-vo Mashinostroyeniye 1979 168 pp

BUGAYENKO, V. P.

[From REFERATIVNYY ZHURNAL: RAKETOSTROYENIYE No 9, Sep 79 Abstract No 9.41.161 K]

[Text] Some assemblies and fluidic components for pneumatic automation of rockets and spacecraft are examined theoretically and on the basis of experimental data, special features of their design are brought out, and empirical methods of final assembly adjustment as well as test stands for checking out are described. The book has been written for engineers specializing in gas fluidics.
[453-2415]

2415
CSO: 1861

USSR UDC 629.7.036.3-226:533.6

MAXIMUM DIFFUSIBILITY IN RADIAL COMPRESSOR CASCADES

Kuybyshev PROYEKTIROVANIYE I DOVODKA AVIATSIONNYKH GAZOTURBINNYKH DVIGATELEY [Design and Adjustment of Aircraft Gas-Turbine Engines] in Russian 1978 pp 3-19

KOMAROV, A. P.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1979 Abstract No 6.34.28]

[Text] The effect of the geometrical and pneumatic parameters of a radial compressor cascade on maximally achievable diffusibility and maximum permissible rated deflection of flow in the cascade is investigated. A generalized formula for the maximum permissible flow deflection in radial cascades is derived. The reliability of that formula is demonstrated through comparison with experimental findings. Figures 7; references 11.
[448-1386]

1386
CSO: 1861

USSR UDC 536.55:621.44-752

PROCEDURE FOR INVESTIGATING THE TEMPERATURE OF THE HEAT TRANSFER AGENT IN AIRCRAFT GAS TURBINES OPERATING IN TRANSITIONAL MODES

Khar'kov SAMOLETOSTROYENIYE TEKHNIKA VOZDUSHNOGO FLOTA in Russian No 45, 1979 pp 20-25

DOTSENKO, YU. N. and PELEPEYCHENKO, I. P.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1979 Abstract No 6.34.12]

[Text] The principles of the theory of the twin heat-sensor method for measuring rapidly varying temperatures of gas with allowance for radiant heat exchange between the heat sensors and the shield, and for the variation in gas temperature owing to contact with the shield, are expounded. The measurement scheme and techniques of processing experimental data are described. By way of an example, measurements of gas temperature ahead of the turbine of an aircraft engine at start-up are presented. Figures 3; references 5.
[448-1386]

1386
CSO: 1861

USSR UDC 621.039.52:536.2.001.15

EXPERIMENTAL INVESTIGATION OF THE THERMHYDRAULIC STABILITY OF AMB-P REACTOR CHANNELS WITH HEAT TRANSFER INTENSIFIERS

Moscow SBORNIK TRUDOV. NAUCHNO-ISSLEDOVATEL'SKIY ENERGETICHESKIY INSTITUT IMENI G. M. KRZHIZHANOVSKOGO [Collected Papers. Scientific Research Power Engineering Institute imeni G. M. Krzhizhanovskiy] in Russian No 54, 1978 pp 5-20

DUBROVSKIY, I. S., LIVERANT, E. I., LOBACHEV, A. G. and PROSHUTINSKIY, A. P.

[From REFERATIVNYY ZHURNAL, YADERNYYE REAKTORY No 6, 1979 Abstract No 6.50.59]

[Text] The findings of an experimental investigation of the thermohydraulic stability of a full-scale model of an AMB-P 6-tube reactor channel with heat-transfer intensifiers are presented. The authors explain the effect that operating parameters, heat-transfer intensifiers, lengthwise distribution

of heat load, misalignment of power along the tubes, and throttling of flow at inlet have on thermohydraulic stability. The stability and wall-overheating limits of the channel operating modes are investigated. Figures 9; references 6.
[452-1386]

1386
CSO: 1861

USSR UDC 621.039.546.8:621.039.534.001.5

EXPERIMENTAL INVESTIGATION OF THE HYDRODYNAMICS OF TWO-PHASE FLOW IN THE PRESENCE OF RETURN FLOW

Moscow SBORNIK TRUDOV. NAUCHNO-ISSLEDOVATEL'SKIY ENERGETICHESKIY INSTITUT IMENI G. M. KRZHIZHANOVSKOGO [Collected Papers. Scientific Research Power Engineering Institute imeni G. M. Krzhizhanovskiy] in Russian No 54, 1978 pp 71-82

DUBROVSKIY, I. S., KOROL'KOV, B. M. and STRUNEVSKAYA, ZH. S.

[From REFERATIVNYY ZHURNAL, YADERNYYE REAKTORY No 6, 1979 Abstract No 6.50.61]

[Text] The findings of an experimental investigation of the process of convective return cross-flow of the coolant in a boiling reactor with an air-water atmospheric pressure facility are presented. Three domains of two-phase flow in the presence of return cross-flow are identified: homogeneous flow, flow with primary transport of the light phase, and flow with primary transport of the heavy phase. It is shown that in the presence of low transverse pressure drops characteristic of the start-up of fuel elements with thermohydraulically unbalanced cells, the axial-flow mode affects decisively the pattern of return cross-flow. Figures 4.
[452-1386]

1386
CSO: 1861

USSR UDC 621.039.52:531.3.001.5

FEATURES OF THE HYDRODYNAMICS OF ROTATIONAL FLOW

Moscow SBORNIK TRUDOV. NAUCHNO-ISSLEDOVATEL'SKIY ENERGETICHESKIY INSTITUT IMENI G. M. KRZHIZHANOVSKOGO [Collected Papers. Scientific Research Power Engineering Institute imeni G. M. Krzhizhanovskiy] in Russian No 54, 1978 pp 113-125

AGEYEV, A. T., BELOV, V. I. and KARASEV, V. B.

[From REFERATIVNYY ZHURNAL, YADERNYYE REAKTORY No 6, 1979 Abstract No 6.50.63]

[Text] The findings of an experimental investigation of the hydrodynamics of rotational one- and two-phase flow, conducted in a vortex tube of 210 mm diameter, are presented. The angles of twist and true helical velocities in the flow of water and of air-water mixture are determined, the curves of axial and tangential velocities are plotted, and the values of radial differentials are specified. These findings can be utilized in the design of centrifugal separators with axial delivery of flow. Figures 8; references 3. [452-1386]

1386
CSO: 1861

USSR UDC 621.039.52:621.186.2:531.3.001.5

INVESTIGATION OF THE HYDRODYNAMICS OF TWO-PHASE FLOW IN A TRANSVERSELY CORRUGATED PIPE

Moscow SBORNIK TRUDOV. NAUCHNO-ISSLEDOVATEL'SKIY ENERGETICHESKIY INSTITUT IMENI G. M. KRZHIZHANOVSKOGO [Collected Papers. Scientific Research Power Engineering Institute imeni G. M. Krzhizhanovskiy] in Russian No 54, 1978 pp 125-138

ZAKHAROVA, E. A., VASIL'YEVA, R. V., BASOVA, G. G. and BORISOVA, A. I.

[From REFERATIVNYY ZHURNAL, YADERNYYE REAKTORY No 6, 1979 Abstract No 6.50.64]

[Text] The thermal and hydrodynamic characteristics of steam-generating channels were investigated. Experimental findings on the true volumetric steam content and hydraulic drag during the ascent of a non-equilibrium two-phase flow in smooth and corrugated heated pipes are presented. These

findings are then compared with the literature data and design recommendations. Figures 6; references 17.
[452-1386]

1386
CSO: 1861

USSR UDC 629.7.036.3:533.697.4

INVESTIGATION OF THE DYNAMICS OF THE CONVERGENCE OF BAFFLE-GENERATED COUNTERCURRENT WALL JETS WITH SUPERSONIC FLOW

Moscow STRUYNYYE I OTRYVNYYE TECHENIYA [Jet Flows and Detached Flows] in Russian 1979 pp 43-50

GLAGOLEV, A. I. and PANOV, YU. A.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.76]

[Text] The convergence of countercurrent wall jets with M-3 supersonic flow was investigated on a model of a flat tapered plate with removable obstacles containing blow-in orifices. The surface of the model was grooved both along the axis of symmetry and along lines angled at 45° and 90° with respect to the axis of symmetry. Pressure was measured by means of a series of GRM-2 recording manometers. The total pressure in the setup's receiver was P_0 = 12 atm, and the total pressure in the jet P_{oj} varied from 0 to 160 atm. The plate boundary layer ahead of the line of separation was turbulent. To enlarge the area of interaction of the jet with the flow, the leading edge of the plate was attached to the lower edge of a plane supersonic nozzle. The thickness of the boundary layer at the tip of the nozzle was 13 mm. The flow in the neighborhood of the plate was visually observed with the aid of an oil-carbon black coating applied to the plate surface. The pattern of flow around the model was photographed with the aid of a Töpler device. Figures 11; references 6.
[447-1386]

1386
CSO: 1861

USSR UDC 629.7.018.1:533.6.071.2

INVESTIGATION OF AN AERODYNAMIC FACILITY WITH MAGNETOHYDRODYNAMIC ACCELERATION OF GAS FLOW

Moscow TEPLOFIZIKA VYSOKIKH TEMPERATUR in Russian Vol 17 No 1, 1979 pp 163-172

ALFEROV, V. I., VITKOVSKAYA, O. N., RUKAVETS, V. P. and SHCHERBAKOV, G. P.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 6, 1979 Abstract No 6.49.167]

[Text] The distribution of pressures, currents, and voltages at electrodes in an MHD-accelerator channel and the distribution of pressure fields in the active part at the secondary nozzle outlet are measured. In addition, the pattern of flow around elementary solids placed in the active part is investigated. Flow analysis is performed on the basis of numerical solution of quasi-one-dimensional equations of magnetohydrodynamics in which experimentally determined quantities are inserted. It is shown that flow in an MHD channel is accompanied by an increase in the Mach number and in the effective stagnation parameters. Gas flow in the channel is markedly affected by the heat release due to the voltage drop in the near-electrode layers as well as owing to friction. The flow obtained in the active part of the facility is suitable for aerodynamic experiments. Figures 5; references 21. [451-1386]

1386
CSO: 1861

USSR UDC 533.951.8.537.84.532.517.4.538.4

INVESTIGATION OF VELOCITY PROFILE IN THE CHANNEL OF A COMBUSTION-PRODUCT-OPERATED MHD GENERATOR

Moscow TEPLOFIZIKA VYSOKIKH TEMPERATUR in Russian Vol 17 No 1, 1979 pp 173-178

MAZUR, N. I. and NEKHAMIN, M. M.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 6, 1979 Abstract No 6.49.165]

[Text] Velocity profiles in a MHD generator channel in the presence of various electrical modes and working-medium parameters, as measured with the aid of cooled Pitot tubes, are investigated. The increase in profile fullness at the insulating wall under the influence of the magnetic field is discussed. The shape of the profile and the variation in boundary-layer characteristics along the length of the channel are compared with the analytic formulas. Figures 5; references 8.
[451-1386]

1386
CSO: 1861

USSR UDC 621.438:226.3-71:536.2

USE OF A PERFORATED DEFLECTION TO OPTIMIZE THE THERMAL STATE OF COOLED NOZZLE BLADING

Kiev TEPLOOBMEN V ENERGETICHESKIKH USTANOVKAKH [Heat Exchange in Power Plants] in Russian 1978 pp 99-103

CHEPASKINA, S. M. and GERASIMOVA, L. A.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 6, 1979 Abstract No 6.49.65]

[Text] The findings of a comparative analytic investigation of the temperature state of the mean vertical cross section of the deflector nozzle blades of a currently designed gas turbine are presented. The investigation was performed with respect to identical boundary conditions of heat transfer from gas, identical relative air flow rate, identical initial air

temperature, and different variants of cooling systems corresponding to different deflector designs. Figures 2; references 2.
[451-1386]

1386
CSO: 1861

USSR UDC 629.78.048.7

HIGHER ACCURACY OF AVERAGING A NONUNIFORM THERMAL FIELD IN A CLOSED VOLUME

Moscow TRUDY MOSKOVSKOGO VYSSHEGO TEKHNICHESKOGO UCHILISHCHA IMENI N. E. BAUMANA in Russian No 296, 1979 pp 144-148

ARKHAROV, A. M., VYTCHIKOVA, M. A., KRASOV, V. I., PEREDKOVA, V. D., SHABANOV, A. P. and SENSKIKH, S. N.

[From REFERATIVNYY ZHURNAL: RAKETOSTROYENIYE No 9, Sep 79 Abstract No 9.41.162]

[Text] It is pointed out that an objective evaluation of the thermal field in a closed gaseous volume, in terms of function $T(x,y,z,t)$ describing the temperature distribution over this volume, plays an important role in a performance inspection of a heat regulation system for a hermetic spaceship cabin and in determining the conditions of comfort to a person dwelling in such an artificial environment. In order to solve various practical problems, it is often found necessary to know the mean-over-the-volume temperature $T_m(t)$ of a bounded gaseous medium. Here an algorithm of $T_m(t)$ calculation is proposed which yields a more accurate objective evaluation of a thermal field than the conventional arithmetic averaging. References 3.
[453-2415]

2415
CSO: 1861

USSR UDC 629.7.036.5:533.6

CRITIQUE OF MODEL THEORIES OF THE VELOCITY DISTRIBUTION OF THE CARRIER MEDIUM OF THE TURBULENT FLOW OF GASEOUS SUSPENSIONS

Tallin TURBULENTNYYE DVUKHFAZNYYE TECHENIYA. MATERIALY TRET'YEGO VSESOYUZNOGO NAUCHNOGO SOVESHCHANIYA PO TEORETICHESKIM I PRIKLADNYM ASPEKTAM TURBULENTNYKH TECHENIY [Turbulent Two-Phase Flows. Materials of the Third All-Union Scientific Conference on the Theoretical and Applied Aspects of Turbulent Flows] in Russian Part 2, 1979 pp 5-12

SPOKOYNYY, F. YE. and GORBIS, Z. R.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.169]

[Text] Studies by various investigators based on the two-layer model of the gas velocity profile in the presence of particles are analyzed. Four typical approaches to the problem are isolated and analyzed in detail. The underlying assumptions of these approaches are critically analyzed, and ways of rectifying a number of shortcomings are outlined. Other approaches to the analysis of the velocity profile of the carrier medium in the gas-suspension flow are briefly discussed. References 8.
[447-1386]

1386
CSO: 1861

USSR

UDC 532.529

ON THE POSSIBILITY OF ANALYZING THE TURBULENT FLOW OF GAS PLUS INERTIAL PARTICLES WITH THE AID OF EQUATIONS OF THE SECOND MOMENTS OF THE FIELD OF EDDY VELOCITIES

Tallin TURBULENTNYYE DVUKHFAZNYYE TECHENIYA. MATERIALY TRET'YEGO VSESOYUZNOGO NAUCHNOGO SOVESHCHANIYA PO TEORETICHESKIM I PRIKLADNYM ASPEKTAM TURBULENTNYKH TECHENIY [Turbulent Two-Phase Flows. Materials of the Third All-Union Scientific Conference on the Theoretical and Applied Aspects of Turbulent Flows] in Russian Part 2, 1979 pp 13-20

DEREVYANKO, G. V., SPOKOYNYY, F. YE. and GORBIO, Z. R.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.16]

[Text] A system of equations of the velocity fields and concentrations of constituents for the axisymmetric turbulent flow of a gas suspension is derived. It is proposed that the coefficients of turbulent exchange be calculated with the aid of the equation of turbulent energy balance and the scale equation. Allowing for model theories of the processes determining the generation, diffusion, and dissipation of the kinetic energy of pulsating motion, approximation formulas for the closure of these equations are proposed. An algorithm based on an iterative scheme is developed for the numerical solution of that system of equations. References 8. [447-1386]

1386
CSO: 1861

USSR UDC 532.529

MOTION OF A DISCRETE MATERIAL AND FRICTION DRAG OF A DISCRETE PHASE OF FINE-DISPERSE PIPE FLOW OF THE GAS PLUS SOLID PARTICLES TYPE

Tallin TURBULENTNYYE DVUKHFAZNYYE TECHENIYA. MATERIALY TRET'YEGO VSESOYUZNOGO NAUCHNOGO SOVESHCHANIYA PO TEORETICHESKIM I PRIKLADNYM ASPEKTAM TURBULENTNYKH TECHENIY [Turbulent Two-Phase Flows. Materials of the Third All-Union Scientific Conference on the Theoretical and Applied Aspects of Turbulent Flows] in Russian Part 2, 1979 pp 21-31

LLATS, M. K.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.166]

[Text] The existing methods for describing fine-dispersed pipe flow of the gas plus solid particles type are considered and it is stated that one-dimensional models cannot, in principle, describe the complex pattern of the distribution of forces within the flow. It is shown that only an investigation of the distribution of all phase parameters within such a flow assures a substantiated determination of the force of friction of a discrete material against the wall and thereby the isolation of the particular components of the total friction drag of the mixture measured at its boundaries. Figure 1; references 12.
[447-1386]

1386
CSO: 1861

USSR UDC 532.529

EXPERIMENTAL INVESTIGATION OF THE KINEMATIC PATTERN OF FINE-DISPERSE PIPE FLOW

Tallin TURBULENTNYYE DVUKHFAZNYYE TECHENIYA. MATERIALY TRET'YEGO VSESOYUZNOGO NAUCHNOGO SOVESHCHANIYA PO TEORETICHESKIM I PRIKLADNYM ASPEKTAM TURBULENTNYKH TECHENIY [Turbulent Two-Phase Flows. Materials of the Third All-Union Scientific Conference on the Theoretical and Applied Aspects of Turbulent Flows] in Russian. Part 2, 1979 pp 32-46

LAATS, M. K. and MUL'GI, A. S.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.168]

[Text] Certain experimental research findings on the distribution of local parameters of gaseous and discrete phases as a function of external mode and design parameters are presented. The possibilities for utilizing these data to determine the dynamic properties of flow phases are demonstrated. Figures 9; references 12.
[447-1386]

1386
CSO: 1861

USSR UDC 532.529

STUDY OF THE MOTION OF PARTICLES AND THE DISCRETE PHASE OF FINE-DISPERSE PIPE FLOW: CONCEPTS OF EXPERIMENTERS

Tallin TURBULENTNYYE DVUKHFAZNYYE TECHENIYA. MATERIALY TRET'YEGO VSESOYUZNOGO NAUCHNOGO SOVESHCHANIYA PO TEORETICHESKIM I PRIKLADNYM ASPEKTAM TURBULENTNYKH TECHENIY [Turbulent Two-Phase Flows. Materials of the Third All-Union Scientific Conference on the Theoretical and Applied Aspects of Turbulent Flows] in Russian Part 2, 1979 pp 60-71

LAATS, M. K.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.165]

[Text] On the basis of experimental research findings on the distribution of local parameters (kinematic pattern) of fine-disperse pipe flow and theories of the importance of forces of buoyancy as a factor sustaining the transverse motion of particles, an interpretation of this flow is presented. A classification of modes of discrete-phase motion demonstrating their relationship to the formation of the distribution fields of flow parameters is offered. Figures 2; references 13.
[447-1386]

1386
CSO: 1861

USSR UDC 532.529

INVESTIGATION OF HYDRAULIC DRAG IN THE FLOW OF A GAS SUSPENSION IN A HORIZONTAL PIPE

Tallin TURBULENTNYYE DVUKHFAZNYYE TECHENIYA. MATERIALY TRET'YEGO VSESOYUZNOGO NAUCHNOGO SOVESHCHANIYA PO TEORETICHESKIM I PRIKLADNYM ASPEKTAM TURBULENTNYKH TECHENIY [Turbulent Two-Phase Flows. Materials of the Third All-Union Scientific Conference on the Theoretical and Applied Aspects of Turbulent Flows] in Russian Part 2, 1979 pp 84-90

PECHENEGOV, YU. YA. and KASHIRSKIY, V. G.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.17]

[Text] The results of an experimental investigation of hydraulic drag during the flow of a mixture of air with 0.11-0.22 mm solid marble particles through a horizontal pipe of 14 mm diameter are presented. Correlation equations describing the hydraulic drag of the flow of the gas suspension within the investigated ranges of variation in parameters are derived. The mechanism of the process is discussed. A method for computing the rate of motion of the solid particles in the flow is proposed. Figures 2; references 10.
[447-1386]

1386
CSO: 1861

USSR

UDC 532.529

EXPERIMENTAL INVESTIGATION OF THE FLOW OF A HIGH-CONCENTRATION DISPERSED MEDIUM IN A CIRCULAR HORIZONTAL CHANNEL

Tallin TURBULENTNYYE DVUKHFAZNYYE TECHENIYA. MATERIALY TRET'YEGO VESOYUZNOGO NAUCHNOGO SOVESHCHANIYA PO TEORETICHESKIM I PRIKLADNYM ASPEKTAM TURBULENTNYKH TECHENIY [Turbulent Two-Phase Flows. Materials of the Third All-Union Scientific Conference on the Theoretical and Applied Aspects of Turbulent Flows] in Russian Part 2, 1979 pp 91-98

KATORGIN, B. I., KOSTIKOV, L. YE., LEVCHENKO, V. A., LOZOVETSKIY, V. V. and PEREVEZENTSEV, V. V.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.15]

[Text] The structure and hydrodynamics of the flow of a high-concentration dispersed medium (air-B_4C particles) in a horizontal pipe are investigated. The distribution of the true volume concentration along the length of the channel and the variation in the slip factor with flow rate ϕv are derived with respect to the variation in discharge concentration μ = 235-480. The experimental dependence of the friction coefficient is given for the stabilized sector. The critical flow rate at which the solid phase precipitates in the bottom section of the tube is given as a function of the discharge concentration μ. Figures 5; references 5.
[447-1386]

1386
CSO: 1861

USSR

UDC 532.529

MAXIMUM RATE OF FALL OF SPHEROIDAL BODIES IN LIQUID OR GASEOUS MEDIA

Tallin TURBULENTNYYE DVUKHFAZNYYE TECHENIYA. MATERIALY TRET'YEGO VESOYUZNOGO NAUCHNOGO SOVESHCHANIYA PO TEORETICHESKIM I PRIKLADNYM ASPEKTAM TURBULENTNYKH TECHENIY [Turbulent Two-Phase Flows. Materials of the Third All-Union Scientific Conference on the Theoretical and Applied Aspects of Turbulent Flows] in Russian Part 2, 1979 pp 104-110

SHEPELEV, I. A.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.14]

[Text] A formula for computing the maximum rate of fall of a spheroidal body in a liquid or gaseous medium is presented for the case of equilibrium between the attracting force of the body and the drag of the medium. The formula holds true within the Re number range of from 0 to 30,000. Formulas for a rough estimation of the time and trajectory of acceleration of the body from state of rest to maximum rate of fall also are presented. Reference 1.
[447-1386]

1386
CSO: 1861

USSR UDC 532.529

DRAG AND MASS TRANSFER FACTORS OF A DROPLET IN A CONSTRICTED FLOW

Tallin TURBULENTNYYE DVUKHFAZNYYE TECHENIYA. MATERIALY TRET'YEGO VSESOYUZNOGO NAUCHNOGO SOVESHCHANIYA PO TEORETICHESKIM I PRIKLADNYM ASPEKTAM TURBULENTNYKH TECHENIY [Turbulent Two-Phase Flows. Materials of the Third All-Union Scientific Conference on the Theoretical and Applied Aspects of Turbulent Flows] in Russian Part 2, 1979 pp 111-118

RIVKIND, V. YA.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.13]

[Text] Aspects of constricted flow around a particle (droplet) for variously specified conditions at the boundaries of the model cell are discussed within the framework of modifications of the cellular model of hydrodynamic interaction. The findings are analyzed on the basis of a comparison of the computed factors with each other and with published experimental data. Practical approximation formulas are presented. Figure 1; references 11. [447-1386]

1386
CSO: 1861

USSR

UDC 532.529

SYSTEM OF EQUATIONS DESCRIBING TWO-PHASE GAS-DROPLET FLOW

Tallin TURBULENTNYYE DVUKHFAZNYYE TECHENIYA. MATERIALY TRET'YEGO VSESOYUZNOGO NAUCHNOGO SOVESHCHANIYA PO TEORETICHESKIM I PRIKLADNYM ASPEKTAM TURBULENTNYKH TECHENIY [Turbulent Two-Phase Flows. Materials of the Third All-Union Scientific Conference on the Theoretical and Applied Aspects of Turbulent Flows] in Russian Part 2, 1979 pp 119-126

ZUYEV, YU. V. and LEPESHINSKIY, I. A.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNY'E DVIGATELI No 8, 1979 Abstract No 8.34.167]

[Text] A rigorous system of equations describing a two-phase turbulent isothermal flow is derived. This system consists of equations of momentum and mass balance of phases, written for averaged motion. The system is closed with the aid of the equation of state of gas and an equation linking the volume concentrations of individual classes of droplets to the volume concentration of the gas. All the equations of the system are derived with allowance for the mechanical interaction of phases, coagulation, and comminution of droplets. The derived system of equations serves to perform numerical calculations of two-phase turbulent flow. References 8. [447-1386]

1386
CSO: 1861

USSR UDC 532.529

EFFECT OF WEIGHT OF IMPURITY ON THE TURBULENT STRUCTURE OF A VERTICAL TWO-PHASE JET

Tallin TURBULENTNYYE DVUKHFAZNYYE TECHENIYA. MATERIALY TRET'YEGO VSESOYUZNOGO NAUCHNOGO SOVESHCHANIYA PO TEORETICHESKIM I PRIKLADNYM ASPEKTAM TURBULENTNYKH TECHENIY [Turbulent Two-Phase Flows. Materials of the Third All-Union Scientific Conference on the Theoretical and Applied Aspects of Turbulent Flows] in Russian Part 2, 1979 pp 127-133

GIRSHOVICH, T. A. and LEONOV, V. A.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.164]

[Text] The effect of the weight of impurity on the structure of a turbulent jet is evaluated from the standpoint of the Prandtl displacement path. An upward-directed vertical jet with an equilibrium averaged motion of the mixture is considered. It is found that the effect of the weight of an impurity on the turbulent structure of the jet is chiefly determined by a parameter representing the ratio between the eddy velocity at the beginning of existence of the jet and the steady-state velocity of a particle. The effect of weight is substantial when that ratio is below unity. In addition, the effect of the weight of the impurity on the turbulent structure of the flow somewhat increases with increase in impurity concentration and relative particle size. Figure 1; references 3.
[447-1386]

1386
CSO: 1861

USSR UDC 532.529

ANALYSIS OF THE PRINCIPAL SEGMENT OF TWO-PHASE TURBULENT FLOW

Tallin TURBULENTNYYE DVUKHFAZNYYE TECHENIYA. MATERIALY TRET'YEGO VSESOYUZNOGO NAUCHNOGO SOVESHCHANIYA PO TEORETICHESKIM I PRIKLADNYM ASPEKTAM TURBULENTNYKH TECHENIY [Turbulent Two-Phase Flows. Materials of the Third All-Union Scientific Conference on the Theoretical and Applied Aspects of Turbulent Flows] in Russian Part 2, 1979 pp 137-141

KARTUSHINSKIY, A. I. and FRISHMAN, F. A.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.170]

[Text] Integral calculations of the principal sector of two-phase inequilibrium axisymmetric turbulent flow with a variable two-phase Schmidt number are presented. The investigated quantities (mass of solid substance, velocities of both phases) were derived from the laws of the conservation of mass of the matter, the combined momentum of two-phase flow, the matter momentum equation, and the combined momentum of the two-phase flow ahead of the half-concentration radius.
[447-1386]

1386
CSO: 1861

USSR UDC 532.529

EFFECT OF INITIAL SLIDING ON THE DIFFUSION OF AN IMPURITY IN A TWO-PHASE JET

Tallin TURBULENTNYYE DVUKHFAZNYYE TECHENIYA. MATERIALY TRET-YEGO VSESOYUZNOGO NAUCHNOGO SOVESHCHANIYA PO TEORETICHESKIM I PRIKLADNYM ASPEKTAM TURBULENTNYKH TECHENIY [Turbulent Two-Phase Flows. Materials of the Third All-Union Scientific Conference on the Theoretical and Applied Aspects of Turbulent Flows] in Russian Part 2, 1979 pp 149-157

NAVOZNOV, O. I., PAVEL'YEV, A. A., MUL'GI, A. S. and LAATS, M. K.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.163]

[Text] Experimental data on the movement and distribution of a finely divided heavy impurity in a two-phase jet flowing out of a tube are presented, and the possibility, ensuing from the flow patterns of the fine-disperse mixture, of controlling the distribution of the finely divided impurity within the flow (in the working chamber) is described. Figures 5; references 3.
[447-1386]

1386
CSO: 1861

USSR UDC 533.697.4

TURBULENT JET FLOWS. MATERIALS OF THE THIRD ALL-UNION SCIENTIFIC CONFERENCE ON THE THEORETICAL AND APPLIED ASPECTS OF TURBULENT FLOWS. PART I

Tallin TURBULENTNYYE STRUYNYYE TECHENIYA. MATERIALY TRET'YEGO NAUCHNOGO SOVESHCHANIYA PO TEORETICHESKIM I PRIKLADNYM ASPEKTAM TURBULENTNYKH TECHENIY, Chast' I in Russian, Institute of Thermal Physics and Electrophysics, Academy of Sciences, Estonian SSR, 1979 246 pp

RUD', YU. A., Editor

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.8 K]

[Text] This collection contains articles on topical aspects of basic and applied research into turbulent jet flow. Modern semiempirical theories of turbulence are used to solve a broad range of problems of turbulent jet flow in bounded and unbounded spaces, as well as detached flow. Special attention is devoted to the theoretical and experimental investigation of the microstructure of flow turbulence and of its relationship to the integral parameters of averaged motion. The papers published in this collection are of interest to researchers dealing with the aeromechanics of jet flow, as well as to specialists working on the development of technical devices requiring the application of effective turbulent mixing techniques. [447-1386]

1386
CSO: 1861

USSR UDC 533.697.4

PROPAGATION OF PRESSURE FLUCTUATIONS IN TURBULENT FLOW

Tallin TURBULENTNYYE STRUYNYYE TECHENIYA. MATERIALY TRET'YEGO VSESOYUZNOGO NAUCHNOGO SOVESHCHANIYA PO TEORETICHESKIM I PRIKLADNYM ASPEKTAM TURBULENTNYKH TECHENIY [Turbulent Jet Flows. Materials of the Third All-Union Scientific Conference on the Theoretical and Applied Aspects of Turbulent Flows] in Russian Part 1, 1979 pp 5-19

ABRAMOVICH, G. N.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.95]

[Text] Pressure and velocity fluctuations both within and outside the turbulent flow zone are investigated. The aim of this study is to determine direct relationships between the characteristic linear scales and the fluctuating and averaged characteristics of turbulent flow that can be utilized to derive the transport coefficient in the differential equations of averaged flow as well as in the complementary equations of turbulent characteristics. The findings of this study also serve to analyze the dynamic loads acting on the structural components interacting with the flow, to determine the acoustic effect of the flow on the ambient medium, etc. Figures 2; references 5.
[447-1386]

1386
CSO: 1861

USSR

UDC 533.697.4

EXPERIMENTAL INVESTIGATION OF A TURBULENT SUBMERGED JET FLOWING BETWEEN PARALLEL PLANE SURFACES

Tallin TURBULENTNYYE STRUYNYYE TECHENIYA. MATERIALY TRET'YEGO VSESOYUZNOGO NAUCHNOGO SOVESHCHANIYA PO TEORETICHESKIM I PRIKLADNYM ASPEKTAM TURBULENTNYKH TECHENIY [Turbulent Jet Flows. Materials of the Third All-Union Scientific Conference on the Theoretical and Applied Aspects of Turbulent Flows] in Russian Part 1, 1979 pp 115-121

LEVIN, V. S. and OSTROVSKIY, V. L.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.347.97]

[Text] The findings of an experimental investigation of the expansion of a turbulent submerged jet flowing between parallel plane surfaces are presented. The principal aim of the study is to investigate the effect of the distance between the surfaces on the pattern of variation in the axial velocity of the jet and in the velocity distribution profile. Figures 6; references 4.
[447-1386]

1386
CSO: 1861

USSR UDC 533.697.4

INFLUENCE THAT THE END OF A SUPERSONIC NOZZLE HAS ON FLOW IN THE SUBSONIC PART OF AN OVEREXPANDED JET

Tallin TURBULENTNYYE STRUYNNE TECHENIYA. MATERIALY TRET'YEGO VSESOYUZNOGO NAUCHNOGO SOVESHCHANIYA PO TEORETICHESKIM I PRIKLADNYM ASPEKTAM TURBULENTNYKH TECHENIY [Turbulent Jet Flows. Materials of the Third All-Union Scientific Conference on the Theoretical and Applied Aspects of Turbulent Flows] in Russian Part 1, 1979 pp 209-217

BELOV, I. V., KAPUSTIN, YE. A., NESHCHERET, P. A. and SHLIKH. O. E.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.162]

[Text] Systematic research has established that the pressure fields in the subsonic part of an overexpanded jet vary with variation in nozzle face diameter in a nearly harmonic oscillating dependence. Measurements of parameters in cross sectional areas show that the variation in pressures is inversely proportional to the variation in the turbulence coefficient, which also makes it possible to derive that coefficient from the proposed relations. Variation in nozzle face diameter may alter the turbulence coefficient within the range of 0.06-0.11. Figures 5; references 10.
[447-1386]

1386
CSO: 1861

USSR UDC 532.517

"EQUIVALENT SMOOTHNESS" OF ROUGH SURFACES IN THE PRESENCE OF TURBULENT MOTION NEAR A WALL

Ufa VOPROSY TEORII I RASCHETA RABOCHIKH PROTSESSOV TEPLOVYKH DVIGATELEY [Problems of Theory and Design of Heat Engine Processes] in Russian No 2, 1978 pp 15-26

GALIMZYANOV, F. G. and GALIMZYANOV, R. F.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1979 Abstract No 3.34.8]

[Text] It is shown that the "equivalent sand roughness" adopted in the semi-empircal theory of wall turbulence displays a number of shortcomings. Analysis of turbulent motion in smooth and rough tubes leads to recommending the employment of "equivalent smoothness" in the capacity of "equivalent roughness," since then the criterion is independent of the roughness of a particular tube. The equivalent of tube roughness is represented by the thickness of the viscous sublayer of turbulent motion in hydraulically smooth tubes. Then the "equivalent smoothness" of a rough tube is determined as a function of the equivalence of width of the dissipative layer in rough and smooth tubes. This condition corresponds to equality of the coefficients of frictional drag and dimensionless mean velocity in smooth and rough tubes. The special features of turbulent motion in the transition zone are considered. Figures 2; references 5.
[448-1386]

1386
CSO: 1861

USSR UDC 621.438

OPTIMAL GEOMETRY OF THE COOLING DUCT OF A DEFLECTOR NOZZLE BLADE

Ufa VOPROSY TEORII I RASHCHETA BABOCHIKH PROTSESSOV TEPLOVYKH DVIGATELEY [Problems of Theory and Design of Heat Engine Processes] in Russian No 2, 1978 pp 63-66

ISKAKOV, K. M. and TRUSHIN, V. A.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1976 Abstract No 6.34.32]

[Text] A method for determining the geometry of the cooling duct of a deflector nozzle blade with a uniform temperature field along the periphery of its shape is presented. In the calculations the flow rate of air required to cool the blade is matched to the flow rate possible for a given geometry, with the aid of hydraulic calculations. Sample calculations performed with the aid of the M-222 computer are presented. Figures 4; references 8.
[448-1386]

1386
CSO: 1861

USSR UDC 532.525.2:533.6.011.51

FORMATION OF LATERAL FORCES DUE TO PLANE NOZZLE ASYMMETRY

Ufa VOPROSY TEORII I RASCHETA RABOCHIKH PROTSESSOV TEPLOVYKH DVIGATELEY [Problems of Theory and Design of Heat Engine Processes] in Russian No 2, 1978 pp 128-133

ARSLANOVA, M. Z., GALIMKHANOV, N. KH., KLEVANSKIY, V. M., KOLOBKOV, A. V., SMIRNOV, YU. V. and KHABIROV, S. V.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1979 Abstract No 6.36.46]

[Text] A mathematical model serving to compute the pressure drop at nozzle walls in the presence of asymmetrical flow is presented. A supersonic plane nozzle with a curved critical cross-section is considered. The equation of plane potential flow is linearized on the basis of the assumption of one-dimensionality of flow. The problem is solved numerically by the method of characteristics. The findings indicate that the dependence of pressure drop distribution between the walls along the length of the nozzle is of an alternating nature. Gas was blown through plane models of nozzles. The agreement between theoretical and experimental findings was satisfactory. Figures 3; references 3.
[448-1386]

1386
CSO: 1861

USSR UDC 629.7.036.3:532.5

CALCULATION OF POTENTIAL INCOMPRESSIBLE FLUID FLOW AROUND AN AXIAL-FLOW TURBOMACHINERY BLADE RING

Novosibirsk ZHURNAL PRIKLADNOY MEKHANIKI I TEKHNICHESKOY FIZIKI in Russian No 2, 1979 pp 119-127

RYABCHENKO, V. P.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETYYE DVIGATELI No 6, 1979 Abstract No 6.34.27]

[Text] A numerical method for computing the aerodynamic characterics of steady-state flow of an incompressible fluid around a blade ring is proposed; the method is based on the vortical theory of the helix and of a finite-span wing. With the aid of numerical analysis the effect of the parameters of the cascade and blade shape on the aerodynamic forces acting both on the entire blade and on its cross section over its height is investigated. It is found that in the case of moderately and very close blade spacing in cascades, there is a considerable difference in the results of calculations with consideration of the third dimension and in the two-dimensional approximation, whereas this difference is insignificant in the case of blades spaced far apart. Figures 6; references 14.
[448-1386]

1386
CSO: 1861

USSR UDC 621.438-55(088.825)

FLUIDIC TIME ANALYZER

USSR Author's Certificate Cl. G 06 D 1/00, No 637803 filed 24 May 76, published 15 Dec 78

BELUKOV, A. A., VANSKIY, YU. V., KASIMOVA, A. M. and PEYSAKHOVICH, A. I.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 6, 1979 Abstract No 6.39.146 P]

[Text] A fluid-logic time analyzer designed for automatic gas-turbine-engine control systems assembled from fluid logic elements is proposed. The fluid-logic time analyzer contains a phase discriminator whose first and second outputs connect to the integrator inputs. To broaden its range of applications, the analyzer contains pulsers, an OR element, a threshold element, flip-flops, switches, and amplifiers. The integrator outputs connect to the first and second pulsers and to the inputs of the OR element, whose output connects via the threshold element to the first inputs of the flip-flops. The second inputs of the flip-flops connect to the outputs of the corresponding pulsers. The output of the first flip-flop connects to the first input of the second switch whose second input connects via the corresponding amplifier to the second output of the phase discriminator. The output of the second flip-flop connects to the first input of the first switch whose second input connects via the corresponding amplifier to the first output of the phase discriminator, with the switch outputs representing the outputs of the analyzer. Figure 1.
[451-1386]

1386
CSO: 1861

USSR UDC 629.7.036.3-55(088.8)

FLOW CONTROLLER

USSR Author's Certificate C1 F 15 C 1/08, No 640054 filed 28 Nov 77 published 30 Dec 78

ZOLOTAREVSKIY, S. A., BELUKOV, A. A. and PEYSIKHOVICH, A. I.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.111 P]

[Text] A flow control device containing a fluidic amplifier whose output channels are connected to the outputs of the device, 2 swirl chambers, a flow supply channel, and the input channels of the device, is proposed. To broaden the operating range of the device, the tangential channels of its swirl chambers are connected to the control channels of the fluidic amplifier, while the central channels of these chambers are connected to the input channels of the device. Figure 1.
[447-1386]

1386
CSO: 1861

USSR UDC 629.78.064.3

STRENGTH OF PIPELINES CARRYING A LIQUID

Khar'kov DINAMIKA SISTEM NESUSHCHYKH PODVIZHNUYU RASPREDELENNUYU NAGRUZKU [Dynamics of Systems Carrying a Mobile Distributed Load] in Russian No 1, 1978 pp 51-56

SUPRUNENKO, N. A., DOTSENKO, P. D. and KASHEVAROV, G. V.

[From REFERATIVNYY ZHURNAL: RAKETOSTROYENIYE No 9, Sep 79 Abstract No 9.41.164]

[Text] Some problems of strength are considered relative to rectilinear and curvilinear segments of pipelines carrying a stream of liquid. The dependence of stresses in the pipe walls on the velocity and the pressure of the liquid is examined. The weight of pipe and liquid is taken into account. Pipes made of alloys AMG-6 and MA-2-1 respectively are compared. The problem of strength is solved for various modes of fastening of a pipeline carrying an ideal or a viscous liquid. The effect of curvature of the pipe axis on the magnitude of stresses is also examined. Figures 3; references 5.
[453-2415]

2415
CSO: 1861

USSR UDC 629.78.015.4

SOME PROBLEMS IN THE DYNAMICS OF SHELLS CARRYING A LIQUID

Khar'kov DINAMIKA SISTEM NESUSHCHYKH PODVIZHNUYU PASPREDELENNUYU NAGRUZKU [Dynamics of Systems Carrying a Mobile Distributed Load] in Russian No 1, 1978 pp 102-109

DOTSENKO, P. D. and DZYUBENKO, O. V.

[From REFERATIVNYY ZHURNAL: RAKETOSTROYENIYE No 9, Sep 79 Abstract No 9.41.165]

[Text] Equations of motion are derived for three-dimensionally curvilinear shells carrying a liquid. The liquid in the stream is assumed to be viscous and compressible. Transient motion is considered. The equations appear in vector form. Figures 2; references 3.
[453-2415]

2415
CSO: 1861

USSR UDC 621.78.011

CERTAIN PATTERNS OF THE THERMALLY STRESSED STATE OF A HEATED POROUS CYLINDER WITH TRANSLATIONAL WALL COOLING

Minsk IZVESTIYA AKADEMII NAUK BSSR. SERIYA FIZIKO-TEKHNICHESKIKH NAUK in Russian No 2, 1979 pp 82-84

TRET'YAK, M. S.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.36]

[Text] The paper gives the findings of a theoretical investigation of the elastoplastic state of a hollow porous cylinder that arises as a result of steady heat flux to the inside surface of the cylinder with simultaneous wall cooling by means of a gas supplied counter to the heat flux via wall pores. Figures 3; references 5.
[447-1386]

1386
CSO: 1861

USSR UDC 621.438-233.2

CERTAIN DESIGN FEATURES OF RADIAL ROLLER BEARINGS AND THEIR EFFECT ON RELATIVE SLIP

Kuybyshev KONTAKTNO-GIDRODINAMICHESKAYA TEORIYA SMAZKI I YEYE PRAKTICHESKOYE PRIMENENIYE V TEKHNIKE. MATERIALY VTOROY VSESOYUZNOY NAUCHNO-TEKHNICHESKOY KONFERENTSII [Contact-Hydrodynamic Theory of Lubrication and its Practical Application in Technology. Materials of the Second All-Union Scientific and Technical Conference] in Russian No 2, 1978 pp 107-113

SOKOLOV, YU. G., DANIL'CHENKO, A. I. and LITVINOV, YE. M.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 6, 1979 Abstract No 6.49.136]

[Text] The condition of slip-free movement of rollers is examined, as is the effect of various modifications, tolerance adjustments, and surface roughness on the magnitude of relative slip. The findings of an experimental investigation are presented. Figures 7; references 8.
[451-1386]

1386
CSO: 1861

USSR UDC 629.78.015.4

DESIGN OF A MULTIPASS FORMING OPERATION FOR AXISYMMETRIC THIN-WALLED SHELLS

Kuybyshev POVYSHENIYE NADEZHNOSTI IZDELIY AVIASTROITEL'STVA TEKHNOLOGICHESKIMI METODAMI [Improving the Reliability of Aircraft Construction Parts by Technological Methods] in Russian 1978 pp 70-78

MORDASOV, V. I. and ARYSHENSKIY, V. YU.

[From REFERATIVNYY ZHURNAL: RAKETOSTROYENIYE No 6, Jun 79 Abstract No 6.41.150]

[Text] Multipass forming of an axisymmetric thin shell is considered in the case of an anisotropic material and a variable wall thickness. The problem is solved in accordance with the principle of mechanics of continuous media. A program is shown for calculation of acting stresses with the aid of a digital computer. Figures 1; tables 1; references 9.
[454-2415]

2415
CSO: 1861

USSR UDC 629.78.015.4

EXPERIMENTAL STUDY PERTAINING TO THE STATE OF STRESS AND STRAIN OF A CYLINDRICAL SHELL ON NONLINEARLY ELASTIC INTERMEDIATE SUPPORTS

Khar'kov PROCHNOST' KONSTRUKTSIY LETATEL'NYKH APPARATOV [Strength of Flightcraft Components] in Russian No 5, 1978 pp 115-118

MEKA, A. I.

[From REFERATIVNYY ZHURNAL: RAKETOSTROYENIYE No 6, Jun 79 Abstract No 6.41.144]

[Text] The state of stress and strain of a cylindrical shell on nonlinearly elastic supports was studied by experimental methods. Here the experimental data pertaining to such a structure under various kinds of loads are presented and compared with theoretical data. Figures 2; tables 3; references 4. [454-2415]

2415
CSO: 1861

USSR UDC 629.7.036.3:539.

OSCILLATIONS OF SHELLS OF REVOLUTION RIGIDLY JOINED TO ANOTHER BODY ALONG A CURVILINEAR CONTOUR

Kuybyshev PROYEKTIROVANIYE I DOVODKA AVIATSIONNYKH GAZOTURBINNYKH DVIGATELEY [Design and Adjustment of Aircraft Gas-Turbine Engines] in Russian 1978 pp 47-59

KONDRASHOV, N. S.

[From REFERATIVNYY ZHURNAL AVIATSIONNYYE I RAKTENYYE DVIGATELI No 6, 1979 Abstract No 6.34.22]

[Text] The problem of steady-state harmonic oscillations of a thin-walled shell of revolution and a body rigidly joined to it is considered. By virtue of linearity of the problem, its solution reduces to finding the fundamental and perturbed stressed and deformed states. The perturbed state is determined by the forces of interaction between the shell and the body joined to it, which are derived from a solution of an integral Fredholm's equation of the first kind. Green's matrices are consistently used in the solution of

the problem. Hence a numerical method for determining Green's matrices is proposed for the implementation of the algorithm. Figure 1; references 9. [448-1386]

1386
CSO: 1861

USSR UDC 629.7.036.3:539.4

APPLICATION OF THE DYNAMIC RIGIDITY METHOD TO THE CALCULATION OF THINWALLED HOUSINGS

Kuybyshev PROYEKTIROVANIYE I DOVODKA AVIATSIONNYKH GAZOTURBINNYKH DVIGATELEY [Design and Adjustment of Aircraft Gas-Turbine Engines] in Russian 1978 pp 59-79

KONDRASHOV, N. S.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1979 Abstract No 6.34.23]

[Text] A numerical method for computing free and forced--due to the action of local loads--vibrations of thinwalled shell housings is described. The algorithm is based on the dynamic rigidity matrix method. Two variants of the algorithm are developed: for finned cylindrical shells with discretely lengthwise varying geometry and properties of the material, and for finned shells of revolution with continuously varying characteristics. The latter variant may also apply to a cylindrical shell as a particular case of a shell of revolution. The results of the application of the continuous variant to computing finned cylindrical shells with piecewise-constant thickness are presented. Figures 13; references 8.
[448-1386]

1386
CSO: 1861

USSR UDC 629.7.036.3-226.539.4

DEFORMATION OF TURBOMACHINERY BLADES FOLLOWING MACHINING

Kuybyshev VOPROSY PROCHNOSTI I DOLGOVECHNOSTI ELEMENTOV AVIATSIONNYKH KONSTRUKTSIY [Problems of Strength and Durability of Aircraft Structural Elements] in Russian No 4, 1978 pp 72-79

BUKATYY, S. A.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1979 Abstract No 6.34.34]

[Text] A relationship is established between the deformations of twisted blades and the residual stresses arising in their surface layer as a result of machining. It is shown that the change in the curvature of profile due to residual stresses causes a change in twist angle even for elongated and minimally twisted blades. The presented theory is corroborated by experiments on gas-turbine blades. Figures 3; references 7.
[448-1386]

1386
CSO: 1861

USSR UDC 621.643.02:539.4

SPATIAL FLEXURE OF A CURVILINEAR PIPE WITH ALLOWANCE FOR INTERNAL PRESSURE AND ARBITRARY SHAPE OF CROSS SECTIONAL CONTOUR

Khar'kov VOPROSY PROYEKTIROVANIYA SAMOLETNYKH KONSTRUKTSIY [Problems of Designing Aircraft Structural Elements] in Russian No 1, 1978 pp 64-70

URBANOVICH, V. A. and SHELOMOV, N. A.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 8.34.37]

[Text] An algorithm for determining the stress-strain state of a curvilinear pipe with an arbitrary shape of cross-sectional contour is presented, taking into account small deviations from the theoretical contour under a bending load in two planes and under the load of internal pressure. A system of

differential equations derived by a variational method is solved with the aid of M. B. Vakhitov's integrating matrix method. Figures 2; references 7.
[447-1386]

1386
CSO: 1861

USSR UDC 62-135-233.2-762

CALCULATION OF THE MAIN CHARACTERISTICS OF TWO-LEVEL CYLINDRICAL GAS-STATIC SEAL BEARINGS

Vladivostok SUDOVYYE ENERGETICHESKIYE USTANOVKI [Marine Power Plants] in Russian No 1, 1978 pp 3-10

TREMASOV, V. V.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 8, 1979 Abstract No 8.49.133]

[Text] The paper points out the feasibility of using two-level cylindrical gas-static bearings with simple feed holes simultaneously as bearings and seals. An analysis is made of the computational formulas and a technique is developed for practical calculation of the main characteristics of seal bearings. Figures 6; references 11.
[445-6610]

6610
CSO: 1861

USSR UDC 621.438-233.2.001.24

CALCULATION OF THE MAIN CHARACTERISTICS OF FLAT ANNULAR GAS-STATIC SEAL BEARINGS

Vladivostok SUDOVYYE ENERGETICHESKIYE USTANOVKI [Marine Power Plants] in Russian No 1, 1978 pp 11-19

KOTYLAR, I. V., TREMASOV, V. V. and SOLOV'YEV, B. I.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 8, 1979 Abstract No 8.49.132]

[Text] An examination is made of the problem of using flat annular two-level gas-static bearings simultaneously as step bearings and as seals in turbomachines. Computational formulas are derived for the main characteristics of seal bearings. An engineering method of calculation is developed. Figures 6; references 14.
[445-6610]

6610
CSO: 1861

USSR UDC 621.822.5.033.001.24

EXPERIMENTAL STUDY OF THE CARRYING CAPACITY OF TWO-LEVEL CYLINDRICAL GAS-STATIC SEAL BEARINGS

Vladivostok SUDOVYYE ENERGETICHESKIYE USTANOVKI [Marine Power Plants] in Russian No 1, 1978 pp 49-52

KOTLYAR, I. V.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 8, 1979 Abstract No 8.49.130]

[Text] An analsysis is made of theoretical and experimental curves for the carrying capacity of a two-level cylindrical gas-static seal bearing with simple feed holes, and the form of the correcting function is selected for the coefficient of the carrying capacity of seal bearings over a wide change in all their parameters. A refined method of calculation was used in designing turbogrinders. Figures 2; references 6.
[445-6610]

6610
CSO: 1861

USSR

UDC 621.822.5:621.1

A NUMERICAL METHOD OF CALCULATING GAS-STATIC TWO-LEVEL RADIAL BEARINGS

Vladivostok SUDOVYYE ENERGETICHESKIYE USTANOVKI [Marine Power Plants] in Russian No 1, 1978 pp 115-121

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 8, 1978 Abstract No 8.49.131]

[Text] The paper gives the derivation of basic characteristics of gas-static two-level radial bearings with internal compensation, and also the results and analysis of calculation carried out for a specific bearing on a Minsk-22M computer. Figures 3; references 11.
[445-6610]

6610
CSO: 1861

Testing and Materials

USSR UDC 536.532

COMBINATION COUNTER FOR MEASURING STAGNATION PRESSURE AND TEMPERATURE IN A STREAM FILAMENT

Kazan' GAZODINAMIKA DVIGATELEY LETATEL'NYKH APPARATOV [Gasdynamics of Flight-craft Engines] in Russian No 1, 1978 pp 105-108

VERCHENOV, A. A., KITAYTSEV, V. A., KLIMNYUK, YU. I. and SIROTKO, I. A.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 8, 1979 Abstract No 3.34.138]

[Text] The findings of an investigation of a combination counter designed to measure stagnation pressures and temperatures in a stream filament are presented. It is shown that the combination counter can be designed to have the same frontal dimensions as the conventional counters used for separate determination of parameters. A comparison of the parameters measured by means of the combination counter with the parameters measured by means of conventional counters demonstrates a satisfactory fit. It is concluded that combination counters can be expediently used in measurements of stagnation pressures and temperatures in the gas-air duct of gas-turbine engines as well as in aerodynamic research. Figures 3; references 3.
[447-1386]

1386
CSO: 1861

USSR UDC 629.7.036.-55

AUTO-OSCILLATION SIGNALING DEVICES FOR AUTOMATIC MONITORING SYSTEMS

Kuybyshev PROYEKTIROVANIYE I DOVODKA AVIATSIONNYKH GAZOTURBINNYKH DVIGATELEY [Design and Adjustment of Aircraft Gas-Turbine Engines] in Russian 1978 pp 85-91

PIS'MENNYY, I. L.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1979 Abstract No 6.34.63]

[Text] The general design principles of automatic systems for monitoring the output of auto-oscillation control processes are examined. A comparative analysis of the errors of signaling devices with linear and logarithmic data sensors is presented. Recommendations for error specification in data sensors incorporated in auto-oscillation signaling devices are given. Figures 3; references 4.
[448-1386]

1386
CSO: 1861

USSR UDC 629.7.036.3:531.7

COMBINED SENSOR FOR MEASURING THE PARAMETERS OF UNSTEADY FLOW IN THE GAS TURBINE ENGINE DUCT

Kuybyshev PROYEKTIROVANIYE I DOVODKA AVIATSIONNYKH GAZOTURBINNYKH DVIGATELEY [Design and Adjustment of Aircraft Gas-Turbine Engines] in Russian 1978 pp 97-100

DYAGILEV, V. N. and KLIMNYUK, YU. N.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1979 Abstract No 6.34.100]

[Text] The basic diagram of a special pressure sensor is presented along with the procedure for processing measurements to calculate certain unsteady-state characteristics of gas flow serving to estimate the effect of unsteady

state on the gas-dynamic stability of engine components as well as to compare the effectiveness of measures to increase the efficiency and stability of engine components. Figure 1; references 4.
[448-1386]

1386
CSO: 1861

USSR UDC 621.165-722

RE-USE OF WASHING OIL IN TURBOMACHINES

SCHMIERUNGSTECHNIK in German Vol 10 No 3, 1979 p 86

GABBERT, H.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 7, 1979 Abstract No 7.49.96 by V. V. Kulichikhin]

[Text] Washing oil is used to clean the foreign inclusions from the important components of turbomachines, including the lubrication system and the regulating system, after installation or overhaul. To reduce losses on this technological operation, it is recommended that the oil be used repeatedly for washing several turbine units when storage facilities are available. Recommendations are made on cleaning the foreign inclusions from the oil and on checking its properties before re-use.
[446-6610]

6610
CSO: 1861

USSR

UDC 621.438-181.48

EXPERIMENTAL STUDIES OF THE CHARACTERISTICS OF MICROTURBINES ON A STAND WITH GAS-LUBRICATED BEARINGS

Vladivostok SUDOVYYE ENERGETICHESKIYE USTANOVKI [Marine Power Plants] in Russian No 1, 1978 pp 52-55

KONCHAKOV, YE. I.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 8, 1979 Abstract No 8.49.142]

[Text] A description is given of an experimental stand for studying air turbines. The investigated turbine had an outside diameter of 45 mm, width of the turbine blades was 7 mm, length of the blades was 3 mm and partiality of admission is 9% (one nozzle). The load turbine had an outside diameter of 30 mm, blade width of 7 mm, blade length of 2 mm, partiality of 100%. The bearing was 25 mm in diameter and 80 mm long. The stand provides satisfactory accuracy in studying microturbines in the speed range from zero to racing speeds. Figures 2; reference 1.
[445-6610]

6610
CSO: 1861

USSR

UDC 621.438

AN EXPERIMENTAL FACILITY FOR STUDYING MICRONOZZLES

Vladivostok SUDOVYYE ENERGETICHESKIYE USTANOVKI [Marine Power Plants] in Russian No 1, 1978 pp 141-145

CHEKHRANOV, S. V. and RASSKAZOV, V. YE.

[From REFERATIVNYY ZHURNAL, TURBOSTROYENIYE No 8, 1979 Abstract No 8.49.140]

[Text] An analysis is made of the designs of micronozzles and the possibilities for improving their efficiency. One of the ways to increase efficiency is to reduce losses in the nozzle and in the stage as a whole by optimizing the rounding radius of the nozzle. A unit is described for testing isolated nozzles. A distinguishing feature of this facility is gas-static

bearings that increase measurement precision in the nozzle by an order of magnitude as compared with a facility on ball bearings.
[445-6610]

6610
CSO: 1861

USSR UDC 629.7.036.002.3

DEVELOPMENT OF HIGH-TEMPERATURE PLASMOTRONS FOR MATERIALS TESTING

Moscow TRUDY CHETVERTYKH CHTENIY, POSVYASHCHENNYKH RAZRABOTKE NAUCHNOGO NASLEDIYA I RAZVITIYU IDEY F. A. TSANDERA. SEKTSIYA 'TEORIYA I KONSTRUKTSIYA DVIGATELEY I LETATEL'NYKH APPARATOV' [Proceedings of the Fourth Readings Dedicated to Development of the Scientific Heritage and Elaboration of the Ideas of F. A. Tsander. Section on the Theory and Design of Engines and Flightcraft] in Russian 1978 pp 14-25

GONOPOL'SKIY, A. N. and SLOBODKINA, F. A.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1979 Abstract No 6.34.112]

[Text] On the basis of a solution of the variational problem the channel shape design and the selection of other control parameters are adapted to maximizing the plasmotron power (or the gas reservoir enthalpy at the output). The flow in the channel is presumed to be subsonic. Its description is based on the previously proposed quasi-one-dimensional model. Figures 3; references 7.
[448-1386]

1386
CSO: 1861

USSR UDC 629.7.036.54:662.75

DEVELOPMENT OF F. A. TSANDER'S IDEAS CONCERNING THE UTILIZATION OF HIGH-ENERGY FUELS

Moscow TRUDY CHETVERTYKH CHTENIY, POSVYASHCHENNYKH RAZRABOTKE NAUCHNOGO NASLEDIYA I RAZVITIYU IDEY F. A. TSANDERA. SEKTSIYA 'TEORIYA I KONSTRUKTSIYA DVIGATELEY I LETATEL'NYKH APPARATOV' [Proceedings of the Fourth Readings Dedicated to Development of the Scientific Heritage and Elaboration of the Ideas of F. A. Tsander. Section on the Theory and Design of Engines and Flightcraft] in Russian 1978 pp 76-82

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1979 Abstract No 6.34.124]

[Text] The properties of liquid hydrogen as a fuel for liquid-propellant thrusters are considered--hydrogen slush, hydrogen gel, hydrogen in the form of a dry metal hydride, atomic hydrogen, and radicals. Figure 1; references 7.
[448-1386]

1386
CSO: 1861

USSR UDC 629.7.036.3:662.75

USE OF HYDROGEN IN GAS TURBINE ENGINES

Moscow VOPROSY ATOMNOY NAUKI TEKHNIKI. ATOMNO-VODORODNOY ENERGETIKI [Problems of Nuclear Science and Engineering. Atomic-Hydrogen Power Engineering] in Russian No 1/5, 1979 pp 119-121

VARSHAVSKIY, I. L., KANILO, P. M. and MALEVANYY, A. P.

[From REFERATIVNYY ZHURNAL, AVIATSIONNYYE I RAKETNYYE DVIGATELI No 6, 1979 Abstract No 6.34.87]

[Text] Treatment with hydrogen affects decisively the process of the ignition and efficient combustion of the basic hydrocarbon fuel of gas turbine engines. This is due to the unique properties of hydrogen as a fuel (broad range of inflammability, rapid rate and temperature of combustion, minimum ignition energy, rapid rate of diffusion, good miscibility with air,

generation of active particles--OH, H, O and of steam as the principal product of the combustion of hydrogen). All this reduces the emission of CO and C_xH_y with spent gases as well as the consumption of hydrocarbon fuels and broadens the stable operating range of combustion chambers. The test findings on the operation of the AI-9 gas turbine engine in a mode simulating the low-gas mode of the AI-25 aircraft gas turbine engine demonstrate that the addition of 5% of hydrogen by weight of the consumption of hydrocarbon fuel to the combustion chamber reduces roughly to one-third the release of CO with the spent gases, and it also reduces to one-sixth the release of benzapyrene. Moreover, the addition of such a proportion of hydrogen reduces by 15-20% the consumption of hydrocarbon fuel.
[448-1386]

1386
CSO: 1861

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