terms than the energy corresponding to the temperature of the reference plane Consequently, one half of the heat flux is due to the upward motion of the molecules, and the other half is due to the downward motion

Let us examine heat transfer near a solid wall The molecules moving toward it from a distance approximately equal to $\bar{l}$, transfer the same excess energy as those moving across the reference plane on one side, i e , one half of the total heat flux In steady state, the heat flux is the same at any distance from the wall This means that the second half of the heat flux near the wall should be contributed by the receding molecules This is only possible if there is a temperature difference between the receding molecules and the aveiage temperature of the gas at the wall, or, in other words, if there is a temperature gradient

Having left the wall, the molecules transfer their excess energy to the gas This excess energy expressed per unit area of 1 cm²/sec is equal to

$$\Delta E = \frac{\gamma + 1}{8} \rho \bar{v} c \, (T - T_a) \tag{8}$$

where ρ is the density of the gas

The heat equilibrium equation at the wall for total energy exchange ($a = 1$) can be written in the form

$$g/2 + \Delta E = g \tag{9}$$

But under actual conditions $a < 1$ Accordingly, the equilibrium equation takes the form

$$a(g/2 + \Delta E) = g \tag{10}$$

whence

$$g = 2a\Delta E/(2 - a) \tag{11}$$

Equation (8) can be reduced to

$$\Delta E = \Lambda_0 p \sqrt{273\,2/T_a}(T - T_a) \tag{12}$$

Substituting this value into (11), we find the following expression for the heat flux at the wall

$$g = 2a\Lambda_0 p \sqrt{273\,2/T_a}(T - T_a)/(2 - a) \tag{13}$$

Let us express the temperature difference by

$$\Delta T = \frac{2 - a}{2a} \frac{g}{\Lambda_0 p \sqrt{273\,2/T_a}} \tag{14}$$

The foregoing equation is similar to the well-known and widely used Kennard equation

$$\Delta T = \frac{2 - a}{2a} \frac{4\gamma}{\gamma + 1} \frac{\bar{l}}{Pr} \frac{dt}{dx} \tag{15}$$

where dt/dx is the temperature gradient at the wall

Let us compare Eqs (3) and (13) The temperature T_a' can be considered equal to T_a provided we further assume that there are no intermolecular collisions at a distance from the wall equal to the mean free path In this case g, as calculated from (13), proves to be greater than in Eq (3) by a factor of $2/(2 - a)$

Since Eq (13) corresponds to universal temperature boundary conditions, it should be given preference in calculations, particularly when the accommodation factor is close to unity

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Digest of Translated Russian Literature

The following abstracts have been selected by the Editor from translated Russian journals supplied by the indicated societies and organizations, whose cooperation is gratefully acknowledged Information concerning subscriptions to the publications may be obtained from these societies and organizations Note: Volumes and numbers given are those of the English translations, not of the original Russian

INDUSTRIAL LABORATORY (*Zavodskaia Laboratoriia*) Published by Instrument Society of America, Pittsburgh, Pa

Volume 28, Number 1, January 1962

Potentiometric Method for Analyzing Mixtures of Organic Acids With Nitric Acid in Nonaqueous Media, A P Kreshkov L N Bykova, M S Rusakova, and N A Kazaryan, pp 10–12

The method is based on the titration of a mixture of nitric and organic acids, in methyl ethyl ketone with 0 1 N tetraethyl ammonium hydroxide in benzene-methanol or in acetone with 0 1 N sodium hydroxide in aqueous acetone It is used for analyzing production mixtures of nitric and α-hydroxyisobutyric acids

Measurement of Absolute Viscosity of a Liquid by the Oscillation Method, G S Rosin, pp 72–74

An oscillation method has been developed for measuring the absolute viscosity A flat vane is used with this method as the oscillating member An equation has been derived for the calculation of the resistance force and the dynamic viscosity from the data obtained by the resonance method

Method for Investigation of Fatigue Failure of Metals by Measuring the Variation of Losses Caused by Magnetic Polarity Reversals, O I Gushcha, pp 76–79

A method and apparatus are suggested for the investigation of the fatigue failure of metals by measuring the change of the magnetic polarity reversal losses in the specimen; they make possible the detection of the place where the fatigue is localized and the determination and separation of the main period of fatigue failure

Volume 28, Number 2, February 1962

Determination of the Residual Stresses in the Brake Drums of Aircraft Wheels, F I Filatov and A I Kolpashnikov, pp 234–236

A new method is suggested for measuring the residual stresses in pressed brake drums made of VM65-1 alloy which is based on the use of resistance strain gages It is also shown that these residual stresses have no effect on the strength of the drums

SOVIET ASTRONOMY (*Astronomicheskii Zhurnal*) Published by American Institute of Physics, New York

Volume 6, Number 5, March–April 1963

Deformation of the Gas Disk of the Galaxy, T A Lozinskaya and N S Kardashev, pp 658–664

A relief map of the hydrogen distribution in the part of the galaxy accessible from the northern hemisphere has been compiled from 21-cm observations made with the radio telescope of the Lebedev Physical Institute The gas deviates from the galactic plane by rather more than was found in previous investigations The deformation in the northern hemisphere is as great as in the southern hemisphere, for equal distances from the galactic center A relief map of the hydrogen distribution has also been drawn with allowance for radial motion Various possible explanations for the observed deformation of the gas disk are considered The most probable hypothesis seems to be a gas dynamic interaction between the galaxy and the intergalactic medium

Volume 6, Number 6, May–June 1963

Problem of the Gravitational Instability of a Compressible Medium, A G Pacholczyk, pp 741–746

The article contains a review of the methods and results of research on the gravitational instability of a compressible gaseous medium Methods used in the investigation of compressible systems are discussed Instability criteria are adduced for the following self-gravitating compressible configurations: 1) an infinite homogeneous medium, 2) a medium consisting of plane-parallel layers, and 3) an axisymmetric medium The second section of the article discusses the problem of the gravitational instability of a conducting medium supporting a magnetic field Applications of this theory of gravitational instability to astorphysics are taken up from the standpoint of the formation of spiral arms, and of stability A bibliography on the gravitational instability of static compressible configurations in the absence of external forces other than magnetic is appended

Stability of Plasma in a Nonuniform Magnetic Field and the Mechanism of Solar Flares, S I Syrovatskii, pp 768–769

The stability of state of magnetohydrostatic equilibrium in plasma with a frozen-in nonuniform magnetic field is studied It is shown that such a state is stable, this being in contradiction with the conclusion obtained in reference given In this connection the initial assumption of the theory of solar chromospheric flares developed in those references is found to be incorrect

Determination of Buildup of Radiation Intensity Prior to the Emergence of a Shock Wave at the Surface of a Star, I A Klimishin, pp 782–783

An expression is derived to determine the buildup in radiation intensity prior to the emergence at the surface of a medium of constant density of a shock wave moving at constant velocity The growth time, or time required for the brightness to build up on the emergence of the luminous front at the boundary of a homogeneous stellar atmosphere, is extremely short: e g , at $n \approx 10^{12}$ and $V = 100$ km/sec it is of the order of 10^{-2} sec and is even shorter in the spectral line As the density of the medium decreases, the growth time of the radiation intensity increases sharply

Diffusion of Resonance Radiation in Stellar Atmospheres and Nebulae I Semi-infinite Medium, V V Ivanov, pp 793–801

The problem of diffusion of resonance radiation in a semi-infinite medium is discussed Completely incoherent scattering is assumed The function $H(z)$, which in this case is analogous to the φ function of Ambartsumyan, is obtained in an explicit form and is computed numerically Milne's problem is solved in the case of completely incoherent scattering The intensity of radiation leaving the medium is expressed in terms of the function $H(z)$ for an exponential distribution of sources of radiation in the medium The resulting line profiles are obtained and are found to be similar to the $L\alpha$ and K_2–K_3 profiles in the solar spectrum

Stability of Stellar Rotation I, V V Porfir'ev, pp 806–807

The problem of the stability of stellar rotation is formulated For a homogeneous model (ρ = const), rigid rotation is stable

Example of "Exchange" in the Three-Body Problem with a Negative Energy Constant, V M Alekseev, pp 858–864

The present paper deals with a particular case of motion of three bodies, more accurately of three mass points which attract one another according to Newton's law In this particular example, "exchange" of bodies of a change between elliptic and hyperbolic motion takes place; namely, as $t \to +\infty$ the distance P_0P_1 is bounded, while the distances P_0P_2 and P_1P_2 tend to infinity, and as $t \to -\infty$ the distance P_0P_2 is bounded while P_0P_1 and P_1P_2 tend to infinity

In this case the energy constant is negative (if the potential energy is taken to be zero at infinity) Therefore, this example contradicts the well-known assertion of Chazy that the class of elliptic or hyperbolic motion cannot change as t varies from $-\infty$ to $+\infty$ Detailed references to the literature and a review of this question can be found in the author's report presented at the All-Union Conference on Theoretical Astronomy in November 1961

Existence of Resonance Phenomena in the Motion of a Satellite Resulting from Its Shape and the Form of Its Orbit, V T Kondurar', pp 865–872

This paper is a continuation of a previous article by the author in which the influence of the shape of a satellite on its rotational motion around the center of mass and on the motion of the center of mass was considered Formulas for the computation of perturbations in the radius vector, longitude, applicate, and the precession and nutation angles were obtained, assuming that the unperturbed orbit of the satellite was a circle

In the present paper, in order to consider motions closer to reality, the circular Keplerian motions of the center of mass are placed by elliptic motions, and the influence of the form of the unperturbed orbit on the motion of the satellite is taken into account It is assumed that the satellite has an axially symmetric density distribution Classical expansions of celestial mechanics for polar coordinates of elliptic motion are used and the resulting differential equations with periodic coefficients of the Hill type are solved Thus new formulas are obtained for the foregoing perturbations If the eccentricity of the unperturbed orbit is zero, these formulas reduce to those given in the reference noted The proposed new formulas can be applied to the study of the translational-rotational motion of celestial bodies (natural and artificial)

Volume 7, Number 1, July-August 1963

A Facula Model, M A Livshits, pp 28–34

Recent observations of the contrasts I_f / I_{ph} of photospheric faculas in the continuum yield an improved facula model The excess radiation flux in faculas ($\approx 10\%$ F) raises from additional energy transfer due to increased convective motion in the active regions

Determination of Some Large-Scale Motion Parameters in the Solar Photosphere, N I Kozhevnikov and M A Klyakotko, pp 44–50

The analysis of the results obtained by the authors in elucidating the nature of the large scale motions in the solar photosphere is given It is found that the velocities $V(\varphi)$ may be represented, in the first approximation, in the form

$$V(\varphi) = K\varphi + \alpha \sin(2\pi\varphi/T)$$

The variation of T previously detected and reported is confirmed The variability of K and α are studied in relation to the solar activity cycle It is shown that K decreases toward the solar activity minimum and increases toward the solar activity