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

maximum The amplitude α increases toward the solar activity minimum It is shown that the pattern of variation in the inclination of the zones lying toward the equator as a function of the phase of solar activity cannot account for these peculiar features

Analogy between the Structure of the Solar System and the Structure of the Galaxy and Other Spirals, M S Éigenson, pp 106–108

In a previous paper we were concerned with the principle of ' vertical ' cosmological similarity According to this principle, cosmic structures of different orders of magnitude exhibit certain well-known similarities One of the examples where this principle applies is the similarity between the structure of globular stellar clusters and centrally symmetric clusters of galaxies These structures in their turn are similar, in the radial distribution of the volume density of a number of structural elements, to an isothermal gaseous sphere Another important example is the similarity between the structural dynamic properties of the solar system and spirals in general, and our galaxy in particular The physical basis of this similarity is frequently found in the fact that the mechanism responsible for the formation of the given structure is, generally speaking, apparently preserved at neighboring structural "stages"

Derivation of the Period and Direction of Rotation of Venus from Radio Observations, A D Kuz'min and A E Salomonovich, pp 116–118

A procedure is described for identifying a periodic component in the variation of Venus' mean brightness temperature A method is proposed for determining the direction of rotation from the variation of the apparent rotational velocity

Thermal Conductivity of Lunar Material from Precise Measurements of Lunar Radio Emission, V D Krotikov and V S Troitskii, pp 119–120

Precise measurements of lunar radio emission yield a value for $\gamma = (K\rho C)^{-1/2}$, averaged over the lunar disk, of 350 ± 75 With our previous value of $\rho \simeq 0.5$ g/cm³ for the density of lunar material, this gives a coefficient of thermal conductivity of $K = (1 \pm 0.5)\ 10^{-4}$ cal/cm sec deg, a value almost 50 times the generally accepted value corresponding to dust in a vacuum Contrary to current ideas, the upper layer of lunar material does not consist of dust, but is solid porous material perhaps somewhat pulverized

SOVIET PHYSICS—SOLID STATE (Fizika Tverdogo Tela) Published by American Institute of Physics, New York

Volume 3, Number 11, May 1962

Kinetics of Photoconductivity in Neutron Irradiated *p*-Type Silicon, A F Plotnikov, V S Vavilov, and L S Smirnov, pp 2363–2367

The paper presents data relating to the concentration of defects introduced into *p*-type silicon by a fast neutron flux The hole capture cross sections of these defects are evaluated; this permits one to arrive at certain conclusions concerning the charge of the defects

Investigation of the kinetics of impurity photoconductivity has proved to be an effective method for determining various parameters of the impurity centers or defects which are present in the semiconductor crystals under observation By studying the kinetics of the photoconductivity associated with excitation of current carriers to levels located in the forbidden gap, one can determine the concentration of centers in the crystal, their carrier-capture cross section, the degree of filling these impurity levels, and other characteristics of the centers

The purpose of this paper is to examine the kinetics of photoconductivity in *p*-type silicon monocrystals which had been subjected to irradiation by a fast neutrons flux

Photomagnetic Effect in *p*-Type InSb at Room Temperature, V F Zolotarev and D N Nasledov, pp 2400–2404

Studies have been made of the photomagnetic effect (PME) in *p* type InSb at room temperature over a range of impurity concentrations from $1.2\ 10^{16}$ to $1.3\ 10^{17}$ cm^{-3} and in magnetic fields from 600 to 16 000 oe It appears that the mobility of electrons determined from the photomagnetic effect on the basis of the phenomenological theory of PME differs from that determined from the Hall effect and conductivity This difference depends on the concentration of acceptors in InSb There is a dependence of the ambipolar diffusion length on magnetic field strength, but it appears that this dependence only partly determines the variation in short-circuited photomagnetic current with change in magnetic field strength On the basis of these investigations it is concluded that there is closer agreement between experiment and PME theory based on the solution of the kinetic equation for the current through the specimen than there is between experiment and the phenomenological theory of PME It is found that the hole mobility in *p*-type InSb at room temperature and at small impurity concentrations is not less than 1700 cm²/v sec, which agrees more closely with the theoretically predicted value of 3600 cm²/v sec than does the value of 750 cm²/v sec given in the literature

It is observed that on illuminating a thin specimen first on a mechanically polished surface and then on an electrolytically polished surface, the photomagnetic effect changes sign This change is due to absorption of light within the specimen

Long-Time Changes of the Contact Potential of Certain Metals under the Action of Light, M C Kosman and S M Gorodetskii, pp 2429–2433

This paper contains a description of experimental investigations of the change in contact potential of aluminum, magnesium, and zinc after illumination The results obtained agree with the model of Kingston and McWhorter, as improved by Abkevich, which is appreciable to surfaces of metals coated by oxide film Within the framework of this model we explain the changes in shape of the relaxation curves for the change in the contact potential observed during absorption of water vapor

Method of Green's Functions in the Theory of Adiabatic Approximation, S V Tyablikov, pp 2500–2509

The method of two time temperature-dependent Green's functions is used to study in the adiabatic approximation the problem of the interaction of a particle (or a system of particles) with a quantized field In this way the results of the adiabatic theory of perturbations are extended to the case of temperatures different from zero

Effects of γ Irradiation on the Spectral Distribution of Photosensitivity of CdS Monocrystals, T Ya Sera, V V Serdyuk, and I M Shevchenko, pp 2568–2569

Volume 3, Number 12, June 1962

Electrical Properties of Amorphous Films and Tellurium and the Effect of Additions on Their Crystallization, Yin Shih-tuan and A R Regel', pp 2627–2631

A study has been made of the temperature dependence of amorphous films of pure tellurium and of tellurium containing 0.5 at % iodine and 0.1 at % selenium The effect of oxygen pressure on the crystallization of amorphous films has been investigated in the case of pure tellurium, and the thermal emf has also been measured The hole concentration and the hole mobility have been calculated from electrical-conductivity and thermal emf data for amorphous films of pure tellurium The hole concentration equals $\sim 10^{17}$ cm^{-3}, and the mobility $\sim 10^{-2}$ cm²/v sec Both quantities are almost independent of temperature, which is a new phenomenon in amorphous materials The experimental results are explained qualitatively on the basis of the concept that amorphous tellurium films consist of a mixture of ring and chain molecules

Thermoelectric Properties of Solid Solutions, Mg_2Si-Mg_2Sn, E N Nikitin, V G Bazanov, and V I Tarasov, pp 2648–2651

It was undertaken to make a material with favorable thermoelectric characteristics based on a solid solution of Mg_2Si Mg_2Sn The thermoelectric power, electrical conductivity thermal conductivity, and their temperature dependences were investigated The thermoelectric efficiency of the alloy $Mg_2Si_{0.7}Sn_{0.3}$ doped with antimony was determined which on the average has $Z = 0.7\ 10^{-3}$ per degree in the temperature interval 200–600°C A study of the Hall effect showed that the dependence of the thermoelectric power on the concentration of current carriers differs from the theoretical formula of Pisarenko

Change of Mechanical Properties of Germanium with Changing Concentration of Current Carriers, N Ya Gorid'ko, P P Kuz'menko, and N N Novikov, pp 2652–2656