L 14358-63 EWT(1)/FCC(w)/BDS AFFTC/ASD IJP(C)

ACCESSION NR: AP3003848 S/0020/63/151/003/0546/0549

53
52

AUTHOR: Stanyukovich, K. P.

TITLE: Generalization of models for the Fridman universe

SOURCE: AN SSSR. Doklady, v. 151, no. 3, 1963, 546-549

TOPIC TAGS: Fridman universe, general theory of relativity, electron mass, electron charge, expanding universe, cosmology, gravitational constant

ABSTRACT: At present, the possibility is being discussed that the gravitational "constant" which appears in the equations of general relativity theory may be actually a function of time. Therefore, Fridman's cosmological model is being generalized to include this possibility. In the classical Fridman models, the rate of expansion is a function of time. The make the rate of expansion in these models constant, it is necessary to introduce an additional tensor of a hypothetical field. The resulting equation is solved. Some relationships obtained, if properly interpreted, may be of interest in the derivation of the mass and energy of the electron. Orig. art. has: 27 equations.

ASSN: Scientific-Research Inst. for Electromechanics

Card 1/2

STANYUKOVICH, K.P.

The variational principle in the general theory of relativity. Dokl. AN SSSR 153 no.3:562-565 N '63. (MIRA 17:1)

1. Predstavleno akademikom Ya. B. Zel'dovichem.

STANYUKOVICH, K.P. (Moscow)

"General variational principles in mechanics of continua and in the theory of field"

Report presented at the 2nd All-Union Congress on Theoretical and Applied Mechanics, Moscow 29 Jan - 5 Feb 64.

[redacted], I.L., doktor fiz.-matem.nauk; [redacted] NIKOL'SKIY, A.M., mlad. nauchn. sotr.; RAYNOVICH, I.B., red.

[Gravitation] Gravitatsiia. Moskva, Izd-vo "Znanie," 1964. 45 p. (Novoe v zhizni, nauke, tekhnike. IX Seriia: Fizika, matematika, astronomiia, no.15) (MIRA 17:8)

B12

ACCESSION NR: AP4037107 S/0258/64/004/002/0318/0321

AUTHOR: Stanyukovich, K. P. (Moscow)

TITLE: An approximate method for integrating equations of plane potential gas flow

SOURCE: Inzhenernyy zhurnal, v. 4, no. 2, 1964, 318-321

TOPIC TAGS: plane gas flow, potential gas flow, nonlinear differential equation, supersonic gas flow, isentropy, steady state gas flow

ABSTRACT: The basic (transformed) equations describing plane potential gas flow are

$$\rho\varphi_\theta = v\psi_v, \quad \rho v\varphi_v = \left(\frac{v^2}{c^2} - 1\right)\psi_\theta. \qquad (1)$$

Here ρ is density, v is total velocity, θ is the angle between direction of velocity and the x axis, φ is potential, and ψ is the flow function:

$$\varphi_x = u, \quad \varphi_y = w, \quad \psi_x = -\rho w, \quad \psi_y = \rho u. \qquad (2)$$

The author uses a method analogous to that of Dombrovskiy but with the advantage

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that it leads, in form, to those solutions which occur for one-dimensional, non-steady-state isentropic gas flows. Transformed equations for plane flows with "imprecisely" approximated isentropy are generally solved precisely. Here, for precise isentropy, the author seeks an approximate solution of the basic equations. These two approaches are complementary. Orig. art. has: 13 formulas.

ASSOCIATION: none

SUBMITTED: 28Jun63 DATE ACQ: 05Jun64 ENCL: 00

SUB CODE: AI NO REF SOV: 005 OTHER: 000

Card 2/2

ACCESSION NR: AT4035829 S/2534/64/000/024/0066/0069

AUTHOR: Stanyukovich, K. P.

TITLE: The problem of evaporation of ice meteors

SOURCE: AN SSSR. Komitet po meteoritam. Meteoritika, no. 24, 1964. Trudy* Desyatoy Meteoritnoy konferentsii v Leningrade 29 maya - 1 iyunya 1962 g., 66-69

TOPIC TAGS: meteor, astrophysics, ice meteor, ice meteor evaporation, meteor shock wave

ABSTRACT: In the study of the process of meteor evaporation an important part is played by the radiation of the shock wave which develops in front of the meteor body during its movement in the atmosphere; the dimensions of the shock wave exceed by approximately one order of magnitude the dimensions of the meteor body. The shock wave itself has an almost spherical form. One of the most complex aspects of the problem is estimation of the velocity of ablation or the velocity of movement of the boundary between the two phases u_f: gas (vapor) - solid (liquid) body. Liquid is written in parentheses because due to heat conductivity and transparency the meteor body will be heated in depth at a rate more rapid than movement of the discontinuity. This paper considers an idealized problem, neglecting heat conductivity and transparency. Light pressure is

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$$p = \frac{4}{3}\frac{\sigma}{c}T^4 \qquad (1)$$

where $\sigma = 5.67 \cdot 10^{-5}$ erg/cm^2·sec·degree^4 is the Stefan-Boltzmann constant, c is the speed of light and T is temperature. Under the influence of the light pressure acting on the body a shock wave develops, behind whose front there is movement of the medium at the velocity u_p, determined from the relation

$$p = \rho_0 u_p \omega, \qquad (2)$$

where ρ_0 is the density of the body and ω is the speed of sound in this body. (1) and (2) give

$$u_p = u_f = \frac{4}{3}\frac{\sigma T^4}{\rho_0 \omega c}. \qquad (3)$$

which can be considered the velocity of movement of the discontinuity between the two phases. Assuming that the medium of which the body consists is liquid, it is possible to compute the velocity of movement of the particles of liquid under the influence of the applied pressure using the relation

$$p = \rho_0 u^{n2}. \qquad (4)$$

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ACCESSION NR: AT4035829

Using (1) and (4) it is found that

$$u_f = u^* = \left(\frac{4\sigma T^4}{3Q_0 c}\right)^{1/4} = \left(\frac{4\sigma}{3Q_0 c}\right)^{1/4} T^{1} \qquad (5)$$

These relations are applicable for relatively small pressures, not exceeding 10^2 kg/cm^2, which is adequate for analysis of meteor phenomena. Since

$$c_v T = \frac{u_0^2}{2} \qquad (6)$$

where c_v is specific heat capacity; u_0 is velocity of movement of the meteor body; $\eta < 1$ is a factor taking into account losses on ionization, dissociation and other energy losses, then

$$u_p = \frac{4\sigma u_0^8}{3Q_0 \omega c}\left(\frac{\eta}{2c_v}\right)^4, \qquad (7)$$

$$u^* = \left(\frac{4\sigma}{3Q_0 c}\right)^{1/4}\left(\frac{\eta}{2c_v}\right)^2 u_0^4. \qquad (8)$$

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For relatively small p formula (7) gives the lower estimate of the evaporation rate and formula (8) the upper limits, without aerodynamic factors taken into account. The author then proceeds to compute the initial intensity of the evaporation process, assuming the meteor body to be spherical. Since the velocity of the evaporating particles considerably exceeds u_p and u^*, the evaporating matter probably will be carried into the tail of the meteor body. In a real case of flow of air particles around the body the evaporation process will be accelerated. As the meteorite breaks apart the evaporation process, especially for an ice meteor, will be accelerated. A specific example is cited and the duration of the evaporation process for a meteor with the specified parameters is determined. Orig. art. has: 18 formulas.

ASSOCIATION: Komitet po meteoritam, Akademiya nauk SSSR (Committee on Meteorites, SSSR Academy of Sciences)

SUBMITTED: 00 DATE ACQ: 28May64 ENCL: 00

SUB CODE: AA NO REF SOV: 005 OTHER: 000

Card 4/4

STANYUKOVICH, K.P.

Evaporation of meteoric ice bodies. Meteoritika no.24: 66-69 '64. (MIRA 17:5)

ACCESSION NR: AP4014446 S/0188/64/000/001/0062/0070

AUTHOR: Stanyukovich, K. P.

TITLE: Generalized variational formalism in the general theory of relativity

SOURCE: Moscow. Universitet. Vestnik. Seriya 3. Fiz. astron., no. 1, 1964, 62-70

TOPIC TAGS: relativity, general relativity, gravity, variational formalism, gravitational field equation, gravitational field pseudotensor

ABSTRACT: The author considers the derivation of gravitational field equations in the presence of matter and the laws of conservation of the energy pulse of matter and of field on the basis of the variation of a generalized lagrangian density with variable $\varkappa$. The role of the lagrangian in this case is played by $R/2\varkappa$, where R is the scalar curvature; $\varkappa$ is a variable parameter characterizing gravitational interactions. In the limiting condition, the usual equations for the gravitational field are obtained, as well as the correct pseudo-tensor of the field, which automatically contains second derivatives. In this connection, there exist real gravitational waves which also shift the energy in an inertial system of coordinates. The normal procedure for isolating the divergence, of which the second derivatives g_{ik} are part, is not covariant and, as is well known, does not lead to a satisfactory pseudo-tensor of the gravitational field nor to the laws of con-

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ACCESSION NR: AP4014446

servation of the energy pulse. Consequently, the variation of the scalar curvature is carried out while taking into consideration the second derivatives g_{ik}. It is not assumed that on the hypersurface $\delta\Gamma_{ik} = 0$. From the very outset, the problem is somewhat generalized, and it is assumed that the "gravitational constant" $\varkappa = \frac{8\,G}{c^4}$, where G is the Newtonian "gravitational constant" and may be a variable or even a tensor, since the relation between the tensor of the field and the tensor of the matter may, in the most general case, be tensorial. Orig. art. has: 47 formulas.

ASSOCIATION: KAFEDRA STATISTICHESKOY FIZIKI I MEKHANIKI MOSKOVSKOGO UNIVERSITETA (Department of Statistical Physics and Mechanics, Moscow State University)

SUBMITTED: 27May63 DATE ACQ: 12Mar64 ENCL: 00

SUB CODE: PH, MM NO REF SOV: 003 OTHER: 002

Card 2/2

ACCESSION NR: AP4012082 S/0020/64/154/002/0313/0316

AUTHOR: Stanyukovich, K. P.

TITLE: Continuous medium Lagrangian in a Riemann space.

SOURCE: AN SSSR. Doklady*, v. 154, no. 2, 1964, 313-316

TOPIC TAGS: Langrangian, Riemann space, relativity theory, continuous medium, Hamilton Jacobi equation, partial differential equation, action function, field equation, electromagnetic field

ABSTRACT: The Hamilton-Jacobi partial differential equation for a single mass point in Riemann space has the form

$$g^{ik}\frac{\partial s^*}{\partial x^i}\frac{\partial s^*}{\partial x^k} = -m^2c^2 = -\frac{\bar{E}^2}{c^2}, \quad (1)$$

where $\bar{E}$ is the particle energy and s* is the effect. Since the energy per particle in the case of a continuous medium is

$$\bar{E} = (\partial\varepsilon/\partial n)_s = m\omega, \quad (2)$$

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ACCESSION NR: AP4012082

where w is the heat content of a total mass unit, σ is the entropy, and n is the density of the particle quantity, (1) can be expressed as

$$g^{ik}\frac{\partial s^*}{\partial x^i}\frac{\partial s^*}{\partial x^k} = -m^2\frac{w^2}{c^2}. \qquad (3)$$

This equation (3) is the Hamilton-Jacobi equation for a continuous medium. Introducing the effects calculated for a unit mass s = s*/m, (3) transform to

$$g^{ik}\frac{\partial s}{\partial x^i}\frac{\partial s}{\partial x^k} + \frac{w^2}{c^2} = 0, \qquad (4)$$

The pressure p is the Lagrangian in continuous media which can be expressed as

$$p = L = (w - E)/v, \qquad (5)$$

where v is the specific volume, the combination of (4) and (5) produces

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ACCESSION NR: AP4012082

$$L = p = \frac{1}{v}[-E + ic\sqrt{g^{ik}s_i s_k}], \qquad (6)$$

These equations are then used to determine the special case of the movement of an ultrarelativistic gas and for the movement of charged particles in continuous media of an electromagnetic field. Orig. art. has: 35 Equations.

ASSOCIATION: Akademiya nauk SSSR (Academy of sciences SSSR)

SUBMITTED: 31Aug63 DATE ACQ: 14Feb64 ENCL: 00

SUB CODE: MM, PH NR REF SOV: 005 OTHER: 000

Card 3/3

STANYUKOVICH, K.P.

New variational formalism in the general theory of relativity.
Dokl. AN SSSR 158 no.1:78-81 S-O '64 (MIRA 17:8)

1. Predstavleno akademikom N.N. Bogolyubovym.

STANYUKOVICH, K.P.

Approximate method of integrating equations for plane potential gas flow. Inzh. zhur. 4 no.2:318-321 '64 (MIRA 17:8)

L 21086-65 EWT(1) ASD(p)-3/ESD(t)/IJP(c)
ACCESSION NR: AP5001983 S/0020/64/159/006/1261/1263

AUTHORS: Iosif'yan, A. G. (Academician AN ArmSSR); Stanyukovich, K. P.; Sokolik, G. A.

TITLE: Analysis of quasi-Maxwellian equations describing compensating fields

SOURCE: AN SSSR. Doklady, v. 159, no. 6, 1964, 1261-1263

TOPIC TAGS: Maxwell equation, linear equation, gravitation, compensating field

ABSTRACT: This paper deals with general quasi-linear equations for an arbitrary field. These equations were first introduced for the case of gravitation in a paper by one of the authors (Iosif'yan, Voprosy* yedinoy teorii elektromagnitnogo i gravitatsionno-inertsial'nogo poley [Problems of Unified Theory of Electromagnetic and Gravitational Fields], Yerevan, 1959). Equations of this type are

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L 21086-65
ACCESSION NR: AP5001983

derivable in natural fashion from the Noether theorem, and the authors formulate this theorem for local gauge transformations. Two pairs of quasi-Maxwellian equations are then derived for the case of gravitational field, having the advantage that their quasi-Naxwellian character is retained even in a strong gravitational field, and the nonlinearity is contained in its entirety in the expression for the current. This nonlinear expression can be used for the description of gravitational waves. Orig. art. has: 8 formulas. "The authors thank N. P. Konopleva whose discussions and ideas stimulated the writing of this paper."

ASSOCIATION: None

SUBMITTED: 15Apr64 ENCL: 00

SUB CODE: GP NR REF SOV: 004 OTHER: 001

Card 2/2

STANYUKOVICH, Kirill Petrovich; LESHKOVTSEV, V.A., red.

[The gravitational field and elementary particles] Gravitatsionnoe pole i elementarnye chastitsy. Moskva, Nauka, 1965. 310 p. (MIRA 18:6)

L 42408-65 EWT(1)/EWP(m)/EPA(sp)-2/EPF(n)-2/EWG(v)/EWG(m)/EPR/EPA(w)-2/T-2/
EWA(m)-2 Pz-6/Po-4/Pd-1/Pab-10/Pe-5/Ps-4/Pi-4 IJP(c) WW/AT
ACCESSION NR: AP5006252 S/0040/65/029/001/0018/0025

AUTHOR: Gurovich, T. Ts. (Moscow); Stanyukovich, K. P. (Moscow)

TITLE: Concerning the application of general variational principles to the relativistic mechanics of an ideal fluid

SOURCE: Prikladnaya matematika i mekhanika, v. 29, no. 1, 1965, 18-25

TOPIC TAGS: relativistic magnetohydrodynamics, aerodynamics, plasma physics, astrophysics, variational calculus, space research

ABSTRACT: The starting point for the discussion here of the various examples for the motion of a relativistic medium in the special theory of relativity and for spherically symmetrical motion in a Schwarzschild gravitational field is the following equation:

$$2\frac{\omega^2}{c^2}(S_n S^m)\left(S_l^i + S^i\frac{\partial \ln\sqrt{-g}}{\partial x^l}\right) + \left(1-\frac{\omega^2}{c^2}\right)S^i\left(\frac{\partial S_n}{\partial x^l}S^m + \frac{\partial S^m}{\partial x^l}S_n\right) = 0 \quad (0.10)$$

Equation (0.10) is also convenient to use in the absence of a gravitational field, if the calculations are carried out in an arbitrary curvilinear coordinate system. No difficulties are encountered in the solution of the equations describing the

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motion of a gas by the method of characteristics in a Schwarzschild field. The steps leading to equation (0.10) are as follows: The Lagrangian of the electromagnetic field is taken in the familiar form (L. D. Landau and Ye. M. Lifshits, *Teoriya polya*. Fizmatgiz, 1960):

$$L_e = -F_{ik}F^{ik}/16\pi, \qquad F_{ik} = \partial A_k/\partial x^i - \partial A_i/\partial x^k \qquad (0.1)$$

where F_{ik} and A_i are the tensor and four-potential, respectively, of the electromagnetic field. The Lagrangian of a continuous medium in the case of isentropic quasi-potential flow is:

$$L_m = p = (w - E)/v = [c\sqrt{-g^{ik}S_iS_k} - E]/v \qquad (0.2)$$

(K. P. Stanyukovich, "Lagrangian of a continuous medium in Riemannian space," *Doklady AN SSSR*, 1964, v. 154, no. 2), where S-the action for matter, E-the mass density of energy, v-specific volume, p-the pressure, w-heat content, g_{ik}-the components of the metric tensor, c-the velocity of light. Also,

$$S_i = \partial S/\partial x^i, \qquad cS_i = wu_i \qquad (0.3)$$

where u_i is the four-component velocity. With the Lagrangian for a continuous medium established, the equations of motion are similarly sought also for the field:

$$\frac{\partial}{\partial S}(\sqrt{-g}L_m) - \frac{\partial}{\partial x^k}\frac{\partial(\sqrt{-g}L_m)}{\partial S_k} = 0 \qquad (0.4)$$

where g is the determinant of the metric tensor g_{ik}. In the case of the presence of an electromagnetic field, calculation of the derivatives is followed by substitution of cS_i by $mu_i + (e/m)A_i$, where (e/m) is the mean ratio of charge to particle mass. In the absence of an electromagnetic field, expression (0.2) is substituted into (0.4), resulting in the following equations of discontinuity:

$$\frac{\partial}{\partial x^k}\frac{\sqrt{-g}S^k}{nw} = 0 \quad \text{or} \quad \frac{\partial}{\partial x^k}\frac{\sqrt{-g}u^k}{v} = 0 \qquad (0.5)$$

Since $v \sim (w - \alpha c^2)^{-1/(k-1)}$ for $pv^k = \text{const}$, the equation (0.2) is written in the form

$$L_m = p = \text{const}\left[-\alpha w + \sqrt{-g^{ik}S_iS_k}\right]^{\frac{k}{k-1}} \qquad (0.6)$$

From (0.4) a similarly more complex equation is obtained:

$$\frac{\partial}{\partial x^n}\left[\frac{\sqrt{-g}S^n}{\sqrt{-S_iS^i}}\left(\sqrt{-S_iS^i} - \alpha w\right)^{\frac{1}{k-1}}\right] = 0 \qquad (0.7)$$

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ACCESSION NR: AP5006252

Instead of (0.7), however, the equation of sound is more convenient to employ. To obtain the latter expression, equations (0.5) are written in the form

$$\frac{S^n}{vw}\frac{\partial \ln \sqrt{-g}}{\partial x^n}+\frac{\partial (S^n/vw)}{\partial x^n}=0 \qquad (0.8)$$

Since $\frac{d\ln w}{d\ln v}=-\frac{\omega^2}{c^2}$ (0.9)

where w is the relativistic speed of sound, the equation (0.8) gives finally the above equation (0.10). The equations of motion of a continuous conducting medium in specific electromagnetic and gravitational fields are obtainable in very elementary fashion by variation of the corresponding Lagrangian equations. The variational principle leads to scalar second-order equations for the analysis of the motion of a medium, significantly more advantageous than the analysis of the usual equations of conservation of momentum, mass, and energy. Orig. art. has: 56 formulas.

ASSOCIATION: none

Submitted: 06May64

Card 4/5

STANYUKOVICH, K.P., prof.; MOMAROV, V.N., zhurnalist

A new concept of the universe. Zem. i vsel. 1 no.1:82-83 Ja-F '65.
(MIRA 18:7)

KOLESNIKOV, S.M. (Moskva); STANYUKOVICH, K.P. (Moskva)

Nonstationary adiabatic centrally symmetrical motions of matter in the general theory of relativity. Prikl. mat. i mekh. 29 no.4: 716-722 Jl-Ag '65. (MIRA 18:9)

L 10765-66 EWT(1)/EWP(m)/FS(v)-3/T/EWA(m)-2 IJP(c) GW

ACC NR: AP5028907 SOURCE CODE: UR/0020/65/165/003/0510/0513

AUTHORS: Stanyukovich, K. P.; Sharshekeyev, O.; Gurovich, V. Ts.

55 44 55 44 55 44

ORG: none

TITLE: Self-similar motion of relativistic gas in the general theory of relativity for a case of point symmetry

21,41,55 21,44,55

SOURCE: AN SSSR. Doklady, v. 165, no. 3, 1965, 510-513

TOPIC TAGS: relativistic gas, astrophysics, special theory of relativity, general theory of relativity, isentropic flow

ABSTRACT: Starting with the Einstein equations $R_i^k - {}^1/_2\delta_i^k R = \varkappa T_i^k$, the following set of adiabatic motion equation is obtained for a relativistic gas

$$\frac{d(wu_i)}{ds} + \frac{\partial w}{\partial x^i} = \frac{w}{2} u^k u^l \frac{\partial g_{kl}}{\partial x^i} + T\frac{\partial \sigma}{\partial x^i},$$

$$\frac{\partial}{\partial x^k}\left(\frac{u^k}{V}\sqrt{-g}\right) = 0, \quad \frac{d\sigma}{ds} = 0$$

where w and σ are the energy content and the entropy, respectively. These can be expressed through the pressure P and specific volume V or

$$w = \frac{k}{k-1}PV + \alpha c^2, \quad PV^k = \sigma.$$

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L 10765-66

ACC NR: AP5028907

The above equations are then written in logarithmic form and are shown to differ from the special theory of relativity by the presence of the two functions λ and ν, $d\tau_0 = e^{(\lambda-\nu)/2}dt$. The self-similar solution is obtained through the functions

$$a = \xi_1(z), \quad 1/V = t^{m_2}\xi_2(z), \quad P = t^{m_3}\xi_3(z),$$

$$e^{\lambda} = t^{m_4}\xi_4(z), \quad e^{\nu} = t^{m_5}\xi_5(z), \quad z = r/t,$$

which lead to a set of five ordinary differential equations in the unknowns $\xi_1 - \xi_5$.

It is shown that, in general, the self-similar solution does not admit of an isentropic flow. Finally, an ultrarelativistic flow is considered with the similarity functions

$$a = \xi_1(z), \quad 1/V = t^{m_2}\xi_2(z), \quad P = t^{m_3}\xi_3(z),$$

$$e^{\lambda} = t^{m_4}\xi_4(z), \quad e^{\nu} = t^{m_5}\xi_5(z), \quad z = r/t.$$

The special case of the motion of a dust type particle in a gravitational field is considered where P = 0 and a = a(λ). The solution gives the following results

$$\rho = 1/V = 1/r^2[c_1 - \varkappa c^2 F(z)],$$

$$z = \frac{e^{-\lambda}}{2}, \quad F(z) = \int \frac{e^{-z}\,dz}{(1-2z)}.$$

This paper was presented by academician L. I. Sedov on 9 April 1965. Orig. art. has: 18 equations.

SUB CODE: 20, 03/ SUBM DATE: 04Apr65/ ORIG REF: 006

Card 2/2

L 15529-66 EWT(d)/EWT(1) IJP(c)

ACC NR: AP5025860 SOURCE CODE: UR/0020/65/164/004/0789/0792

AUTHOR: Stanyukovich, K. P.

52
B

ORG: Scientific-Research Institute of Electromechanics (Nauchno-issledovatel'skiy institut elektromekhaniki)

TITLE: Electrodynamics in Rieman space

SOURCE: AN SSSR. Doklady, v. 164, no. 4, 1965, 789-792

TOPIC TAGS: Rieman space, electrodynamics, cosmology, metagalaxy, electromagnetic field, general relativity theory

ABSTRACT: It is of considerable interest to study in detail the equation of electrodynamics in Rieman spaces taking into account the general curvature of the Friedmanian models of the Universe (Metagalaxy). The author analyses here the earlier results of Eddington and of J. Sing (Obshchaya teoriya otnositel'nosti [General Theory of Relativity], ch. 10, no. 1, IL, 1963) who took into account only the curvature of the space created by the electromagnetic field proper and not the total curvature of the space. The newly formulated expres-

Card 1/2 UDC: 530.12:531.51

L 15529-66

ACC NR: AP5025860

sions automatically eliminate the infrared and ultraviolet catastrophies. The paper also discusses circumstances under which a differentiation of matter and antimatter within the Metagalaxy may be expected. The paper was presented by Academician N. N. Bogolyubov, 12 Mar 65. Orig. art. has: 26 formulas.

SUB CODE: 03 / SUBM DATE: 23Nov64 / ORIG REF: 003 / OTH REF: 002

Card 2/2

L 14853-66 EWT(l)/FBD IJP(c) GW

ACC NR: AP6001726 SOURCE CODE: UR/0020/65/165/004/0806/0808

AUTHORS: Stanyukovich, K. P.; Gurovich, V. Ts.

61
B

ORG: none

TITLE: Ultrarelativistic escape of gas in a gravitational field

SOURCE: AN SSSR. Doklady, v. 165, no. 4, 1965, 806-808

TOPIC TAGS: general relativity, light velocity, radio astronomy, galactic radiation, gas mechanics

ABSTRACT: The authors consider the motion of a gas at velocity close to that of light from the point of view of general relativity, in view of interest that attaches to this problem in connection with observations of quasars and explosions of galactic cores. To this end they modify the equations of motion and continuity previously obtained for the special relativity theory, but to simplify the problem they assume the initial distribution of the pressure and the velocity (the Cauchy problem) to the same form as used for self similar motion of ordinary gas. Although the final equation obtained cannot be solved analyt-

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ACC NR: AP6001726 O

ically, it can be deduced, by examining the escape of an ultrarelativistic gas in an external Schwarzschild field, (scattering of the shell of a relativistic star after emergence of a shock wave traveling from the center to the surface), that the ultrarelativistic escape of initially homogeneous gas sphere behaves essentially like the motion of a gas in an external Schwarzschild field of a specific gravitational radius. This report was presented by Academician L. I. Sedov. Orig. art. has: 17 formulas.

SUB CODE: 20/ 03/ SUBM DATE: 11Jun65/ ORIG REF: 006/

Card 2/2

L 26515-66 EWP(m)/EWT(1)/T-2 IJP(c)

ACC NR: AP6011514 SOURCE CODE: UR/0382/66/000/001/0065/0073

AUTHOR: Golitsyn, G. S.; Dzhuzumkulov, T.; Stanyukovich, K. P. 66 B

ORG: none

TITLE: General solution of the equations of magnetohydrodynamics for one dimensional non-stationary and plane stationary motions

SOURCE: Magnitnaya gidrodinamika, no. 1, 1966, 65-73

TOPIC TAGS: magnetohydrodynamics, mhd flow, [redacted] magnetic field, ideal gas

ABSTRACT: The authors consider the solution of the equations of magnetohydrodynamics for the case of a gas having ideal conductivity, for one dimensional non-stationary and plane stationary motion in a magnetic field perpendicular to the direction of motion. While the fundamental results were previously obtained by one of the authors (with S. A. Kaplan, DAN SSSR 1954, v. 95, 4, 769), the present article presents a solution which is more general and is applicable to one dimensional non-stationary motions. The method used to derive the equation is similar to that used first in ordinary gas dynamics by one of the authors (Stanyukovich, Inzh. zhurnal v. 4, 318, 1964) to investigate plane stationary motions. The resultant partial differential equations are solved approximately by the Chaplygin method. The degree of approximation of the results is briefly discussed. Orig. art. has: 48 formulas.

SUB CODE: 20/ SUBM DATE: 20Oct65/ ORIG REF: 007/ OTH REF: 002

Card 1/1 CC UDC: 533.95:538.4

L 31225-66 EWT(1) WW

ACC NR: AP6008832 SOURCE CODE: UR/0294/66/004/001/0087/0091

AUTHOR: Kiselev, M. I. (Moscow); Stanyukovich, K. P. (Moscow)

ORG: None

TITLE: Contribution to the theory of nonlinear skin effect

SOURCE: Teplofizika vysokikh temperatur, v. 4, no. 1, 1966, 87-91

TOPIC TAGS: heat conductivity, skin effect, magnetic field, metal conductivity, metal heating

ABSTRACT: The authors investigate some solutions of the nonlinear equation of heat conductivity applicable to the description of skin effect phenomena in highly magnetic fields. Two possible versions of the evaluation of the depth of penetration of an electromagnetic field into a metal are studied for the case when the Joule heat release is so high that it is necessary to take electrical conductivity variations with the temperature into consideration. Such evaluations may prove to be interesting for technical applications in heating metal by means of high frequency currents or high-current pulses, in interpreting data in an electrophysical experiment, and in describing transient processes in the critical point of superconductivity. Orig. art. has: 1 figure and 24 formulas.

SUB CODE: 11, 20 / SUBM DATE: 06Jan65 / ORIG REF: 002 / OTH REF: 001

Card 1/1 UDC: 538.6:537.29

L 29568-66 EWT(1) GW

ACC NR: AP6019594 SOURCE CODE: UR/0293/66/004/003/0408/0413

20
B

AUTHOR: Mukhamedzhanov, A. K.; Stanyukovich, K. P.

ORG: none

TITLE: Theory of lunar craters

SOURCE: Kosmicheskiye issledovaniya, v. 4, no. 3, 1966, 408-413

TOPIC TAGS: lunar crater, selenology, lunar landform, ring formation, moon surface, meteorite impact

ABSTRACT: Questions dealing with the expenditure of energy in the formation of craters as the result of meteorite impact are discussed. Specifically, the theory of "explosive diffusion" is advanced to account for the characteristic structure of lunar craters having concentrically enclosed walls (Vitello, Posidonius, Riccioli, Furnerius, Wargentin, Gassendi, Marth, etc.). According to this theory, secondary and even subsequent craters may be formed when the material ejected from the first impact itself strikes the ground. It is further established that each successive impact in the process of "explosive diffusion" is characterized by a lessening of intensity. Orig. art. has: 33 formulas. [DM]

SUB CODE: 03/ SUBM DATE: 10Aug65/ ORIG REF: 009/ OTH REF: 003/ ATD PRESS: 5014

Card 1/1 UDC: 523.34

ACC NR: AP6019527 SOURCE CODE: UR/0020/66/168/004/0781/0784

AUTHOR: Stanyukovich, K. P.

ORG: Scientific-Research Institute of Introscopy (Nauchno-issledovatel'skiy institut introskopii)

TITLE: Concerning one possible type of stable particles in the galaxy

SOURCE: AN SSSR. Doklady, v. 168, no. 4, 1966, 781-784

TOPIC TAGS: elementary nuclear particle, gravitation field, electromagnetic field, galaxy, metagalaxy, cosmology

ABSTRACT: The article deals with the possible existence of quasiparticles (called planckeons) of dimensions equal to the gravitational radius and to their internal radius of curvature, with an internal field corresponding to a Schwarzschild field. It is shown that such particles constitute stable closed Einstein microworlds and are stable against both electromagnetic and gravitational radiation. Their total mass is estimated at approximately the mass of the metagalaxy, so that their energy is of the same order as that of other forms of energy, as should be the case for the uniform model of the universe. Calculation of the frequency of collision of such particles with nucleons shows that the energy released by these collisions is sufficient for formation of new nucleons in accordance with the Dirac-Hoyle theory. The relation between these new particles and heavy gravitons, "maximons," quarks, particles produced by galactic explosions, and similar fundamental particles, is indicated. Arguments are presented in favor of the hypothesis that quasars and other

Card 1/2 UDC: 530.12 + 531.51

ACC NR: AP6019527

3

metagalactic objects are made up of such superdense particles produced in the past and still being produced during the evolution of the metagalaxy. The relation between this hypothesis and other cosmological theories are discussed. The possible existence of other "closed" particles in the metagalaxy is proposed and some of their properties are tabulated. A scheme for the interrelation between elementary and fundamental particles is indicated. The author thanks D. I. Blokhintsev, M. A. Markov, and G. A. Sokolik for an interesting discussion of the results. This report was presented by Academician N. N. Bogolyubov 29 January 1966. Orig. art. has: 8 formulas and 1 table.

SUB CODE: ~~20~~ 03/ SUBM DATE: 31Dec65/ ORIG REF: 005/ OTH REF: 004

Card 2/2 UC

ACC NR: AM5027766 Monograph UR/

Stanyukovich, Kirill Petrovich

19

Gravitation field and elementary particles (Gravitatsionnoye pole i elementarnyye chastitsy) Moscow, Izd-vo "Nauka", 1965. 310 p. illus., biblio. (At head of title: Moskovskoye obshchestvo ispytateley prirody. Sektsiya fiziki) Errata slip inserted. 7600 copies printed.

TOPIC TAGS: gravitation field, gravitation wave, gravitational radiation, general relativity theory, variational method, field theory, gravitation, Riemann space, space curvature, elementary particle

PURPOSE AND COVERAGE: This book may be of interest to persons concerned with problems related to gravitation and the general relativity theory. It represents an attempt by the author to analyze and describe the nature of gravitation within the framework of the general relativity theory. The first section is devoted to the treatment and critical study of the general theory and the variational formalism used in it. It also contains a certain development and generalization of the formalism under the assumption that the relation between the Ricci and energy-momentum tensors can be established with the aid of a (tensor or pseudotensor) matrix and not with a constant. The second section deals with different aspects of the nature of the gravitational field and radiation and contains a generalization of models of the Friedmann Universe. Some hypotheses and less rigorous reasoning regarding the relationship between the particle structure and gravita-

Card 1/4 UDC: 530.12:531.51

tion are introduced. The author thanks G. A. Sokolik, S. M. Kolesnikov, V. Ts. Gurovich, N. P. Konopleva, M. K. Polivanov, V. S. Brezhnev, and V. A. Zakharov for valuable discussions.

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SUB CODE: 20/ SUBM DATE: 19Apr65/ ORIG REF: 055/ OTH REF: 032

Card 4/4

L 46727-66 EWT(1)/EWP(m)/T IJP(c)
ACC NR: AP6021602 SOURCE CODE: UR/0020/66/168/005/1027/1029

AUTHOR: Vrezhnev, V. S.; Stanyukovich, K. P.

ORG: Scientific Research Institute of Introscopy (Nauchno-issledovatel'skiy institut introskopii)

TITLE: Concerning the interaction between a spinor field and a gravitational field

SOURCE: AN SSSR. Doklady, v. 168, no. 5, 1966, 1027-1029

TOPIC TAGS: spinor, gravitation field, quantum number, electron spin, relativistic quantum mechanics, Schroedinger equation

ABSTRACT: The purpose of the study was to find a general-covariant formulation of the Dirac equation in which only the components of the metric tensor are used. A direct generalization of the nonrelativistic Schroedinger equation is obtained first on the basis of the known connection between the components of the 4-momentum of a particle in a gravitational field. A special transformation is used to obtain a wave equation in which the spin of the particle (e.g., electron) is taken into account. It is also shown that a general-covariant generalization of the Dirac equation can also be obtained by a different approach in which the time and space coordinates are not assumed to be symmetrical. In such an approach the particles and antiparticles are asymmetrical in a gravitational field, but the asymmetry depends on the choice of the reference frame. It is concluded that in a gravitational field the concept of spin as a quantum number is meaningless, and the principle of combined inversion ceases to be an absolute law of nature, being fulfilled only in flat 4-space. This

UDC: 530.12 + 531.51

Card 1/2

ACC NR: AT6036284 SOURCE CODE: UR/0000/66/000/000/0054/0065

AUTHOR: Stanyukovich, K. P.; Aytmurzayev, T.; Arkabayev, N.

ORG: none

TITLE: Axisymmetric self-similar relativistic gas flows

SOURCE: AN KirgSSR. Institut fiziki i matematiki. Ploskoparallel'noye i osesimmetricheskoye techniye gazov i zhidkostey (Plane-parallel and axisymmetric flow of gases and liquids). Frunze, Izd-vo Ilim, 1966, 54-65

TOPIC TAGS: relativistic flow, similarity theory, Prandtl boundary layer

ABSTRACT: A finite form of a set of equations of motion is derived for a relativistically moving gas using a general orthogonal curvilinear coordinate system. This system is applied to a case of self-similar stationary relativistic flow with axisymmetric properties for which a spherical coordinate system is shown to be convenient. The solution is obtained in a quadrature form suitable for numerical calculations and which for the case of a very small gas velocity relative to that of light can be expanded in negative powers of the speed of light. This solution has properties which allow considerable simplification in the ultra-relativistic cases. The axisymmetric problem is further extended to include nonstationary flows. Two classes of self-similar flows are considered and it is shown that in both cases the problem can be described by a system

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ACC NR: AT6036284

of four ordinary differential equations. These equations describe the motion of the gas in one plane since otherwise the similarity conditions are violated. Orig. art. has: 32 formulas.

SUB CODE: 20/ SUBM DATE: 28Apr66/ ORIG REF: 005

Card 2/2

STANYUKOVICH, K. V.

Meteorological Abst.
Vol. 4 No.9
Sept. 1953
Part I
Climatology and
Bioclimatology

4.9-207 551.582.2:551.585.5:551.584(57)

Kashkarov, Daniil Nikolaevich, Zhukov, A. and Staniukovich, K., **Kholodnaia pustynia Tsentral'nogo Tian-shania. Resul'taty Ekspeditsii LGU letom 1934 g.** [The cold desert of Central Tien Shan. Results of expedition of LGU (Leningrad State University) in summer 1934.] Leningrad, LGU Izdat., 1937. 116 p. photos., diagrs., graphs, refs. **DLC**—Chap. I (p. 12–35) contains in the section on Macroclimate, data on temperature (yearly mean and seasonal distribution), precipitation, humidity of the air, winds, rate of cooling with altitude, cloudiness, intensity of solar radiation, weather variations, temperature of the soil, permafrost and underground ice. Deviations from the means, which to a certain extent alleviate the gloomy picture described in this section, are discussed in the section on Eco- and Microclimatic Data. The chapter concludes with a comparison of the climate of the cold desert with the climate of Pamirs and Novaya Zemlya. *Subject Headings:* **1. Climatic data 2. Microclimatology 3. Desert climates 4. Tien Shan, Kirgizia 5. U.S.S.R.**—*C.K.*

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Stanyukovich, K. V.: "The effect of various environmental factors on the age composition of the desert bush vegetation in the Pamirs and its replacement", Soobshch. Tadzh. filiala Akad. nauk SSSR, Issue 9, 1948, p. 6-9.

SO: U-3042, 11 March 53, (Letopis 'nykh Statey, No. 10, 1949).

Pamir Biol. Station, Tadzhik Affil, AS

STANYUKOVICH, K. V. PA 17/49T89

USSR/Medicine - Plants May/Jun 48
Medicine - Rainfall

"Vegetable Belts in Eastern Pamir and Their Relationship to the Annual Rainfall and Altitude of Snow Line," K. V. Stanyukovich, Pamir Biol Sta, Tadzhik Affiliate, Acad Sci USSR, 2¼ pp

"Botan Zhur" Vol XXXIII, No 3

Treats subject under the following: (1) height of perpetual snow line, (2) upper limit of vascular plants, (3) nival zone, (4) upper Alpine subzone, (5) lower Alpine subzone, and (6) sub-Alpine zone. Includes diagram. Submitted 10 May 47.

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STANYUKOVICH, K. V.

PA 27/49T77

Feb 49

USSR/Medicine - Plants
Medicine - Regeneration

"The Course of Restoration and Growth of Part of the Semiundergrowth in the High, Mountainous Deserts of Eastern Pamir," K. V. Stanyukovich, Pamirskiy Biol Sta, Tadzhikskiy Assoc, Acad Sci USSR, 3 pp

"Dok Ak Nauk SSSR" Vol LXIV, No 4

Study was undertaken in eastern Pamir because it has been established that a whole series of plants regenerate very badly there. Studied regeneration of undergrowth, of the growing part of its population, and influence of absolute height and moisture on their lenghh of life. Submitted 6 Dec 48.

27/49T77

[redacted]

STANYUKOVICH, K.V.

Dependence of the population age mountain subshrubs on absolute altitude. Dokl. AN Tadzh. SSR no.1:39-42 '51. (MLRA 9:10)

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(Pamirs--Alpine flora)

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Dependence of plants on precipitation in the Alpine zone of the Pamirs. Dokl.AN Tadzh.SSR no.2:9-11 '52. (MLRA 9:9)

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(Pamirs---Alpine flora)

STANYUKOVICH, K. V.

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(Mountains) (Phytogeography)

STANYUKOVICH, K.V.; KRIVONOGOVA, M.B.; LADYGINA, G.M.; SIDOROV, L.F.

Vegetation belts of the Trans-Alai and Alai Ranges in the Kashgar Kyzyl-Su basin. Izv. Otd. est. nauk AN Tadzh. SSR no.16:165-173 '56. (MLRA 10:4)

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(Pamirs--Botany--Ecology)

STANYUKOVICH, Kirill Vladimirovich; BOYARKINA, V., redaktor; TERYUSHIN, M., tekhnicheskiy redaktor.

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Discovery of fossil ice in the Zor-Kul' Valley. Dokl. AN Tadzh. SSR no. 20:51-53 '57. (MIRA 11:7)

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STANYUKOVICH, K.V.; IKONNIKOV, S.S.

Vegetation of the Bilyand-Kiik Valley. Izv. Otd. est. nauk AN Tadzh. SSR no. 24:57-72 '57. (MIRA 11:10)

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Dividing the mountain area of Tajikistan into natural districts. Dokl.AN Tadzh.SSR 3 no.4:31-33 '60. (MIRA 14:4)

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STANYUKOVICH, K.V.

The Mediterranean belt type and its high altitude vegetation in Central Asia. Uch. zap. Dush. gos. ped. inst. 35. Ser. geog. no.2: 185-194 '62. (MIRA 16:9)
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LEONKOV, A.M., kand.tekhn.nauk, dotsent; STAPANCHUK, V.F., kand.tekhn.nauk, dotsent; KRAVETS, V.F., inzh.

Some results in testing of a turbine stage with partial supply of working media. Izv. vys. ucheb. zav.; energ. 5 no.9:72-77 S '62. (MIRA 15:10)

1. Belorusskiy politekhnicheskiy institut. Predstavlena kafedroy teploenergeticheskikh ustanovok elektricheskikh stantsiy.
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(LIVER)

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STAPANENKOV, R., assistent; TOPALOV, V., shturman dal'nego plavaniya

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(Industrial organization)

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STAPANOVA, Ye.S.

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(HYPERTENSION, statist.
in athletes (Rus))
(ATHLETICS--DISEASES AND HYGIENE
hypertension in athletes, statist. (Rus))

STAPANS, A. E.

Mathematical Reviews
Vol. 14 No. 8
Sept. 1953
Analysis

Stapan [Stapans], A. È. On nonlinear integral equations with a discrete spectrum of characteristic values. Latvijas PSR Zinātņu Akad. Vēstis 1951, no. 5 (46), 613–617 (1951). (Russian. Latvian summary)

Let $K(x, y)$ be a continuous symmetric real-valued kernel whose bilinear expansion

$$K(x, y) = \sum_{\nu=1}^{\infty} \frac{\varphi_\nu(x)\varphi_\nu(y)}{\lambda_\nu}$$

in terms of its characteristic functions and characteristic values is uniformly convergent. If the orthonormal system $\{\varphi_\nu(y)\}$ satisfies the additional condition

$$\int_a^b \varphi_{\nu_1}(y)\varphi_{\nu_2}(y)\cdots\varphi_{\nu_{2k+1}}(y)dy = 0 \quad (1 \leqq k \leqq m)$$

for all positive integral values of $\nu_1, \nu_2, \cdots, \nu_{2k+1}$, then the non-linear integral equation

$$u(x) = \lambda \int_a^b K(x, y)\left[u(y) + \sum_{k=1}^{m} C_k u^{2k}(y)\right]dy$$

has a discrete spectrum, identical with that of the linear equation

$$u(x) = \lambda \int_a^b K(x, y)u(y)dy.$$

(0 5 = 1)

As an application, it is shown that the boundary value problem

$$y''+\lambda\left[y+\sum_{k=1}^{m} C_k y^{2k}\right]=0, \quad y(0)=y(2\pi)=0,$$

where the C_k are arbitrary constants, has a discrete spectrum.
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