Stanyukovich, A.V.

81907
S/126/60/010/01/012/019
E111/E335

18.8200

AUTHORS: Stanyukovich, A.V. and Pivnik, Ye.M.

TITLE: Development of Intercrystalline Fracture at High Temperatures and the Plasticity of Steel

PERIODICAL: Fizika metallov i metallovedeniye, 1960, Vol.10, No. 1, pp 106 - 116

TEXT: The authors describe their work on different metals tested under conditions where intercrystalline fracture predominates. An attempt has been made to differentiate between its various forms and establish a relation between the extent to which it occurs and plasticity. Tests were made at constant deformation speeds, as described previously by Stanyukovich and N.D. Zaytser (Ref 6). Type EI10 pearlitic and two austenitic steels were used. The latter were EI612 (iron-chromium-nickel, with tungsten and titanium) and alloy A (high-strength nickel-chromium base, with molybdenum, tungsten, aluminium and titanium). All specimens were subjected to standard heat treatment (Table 1). Test temperatures were 450-800 °C, speeds 180, 3.6, 0.4 and 4 x 10^{-2} %/hour. Polished sections of fracture regions were prepared and etched. The number and

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S/126/60/010/01/012/019
E111/E335

Development of Intercrystalline Fracture at High Temperatures and the Plasticity of Steel

overall length of cracks per unit surface were determined and relative elongation and true resistance to fracture were also found. Microstructures obtained under various conditions are shown in Figs. 1, 3 and 6. Relative elongation and number and extent of microcracks as functions of temperature for types EI10 and EI612 are shown in Figs. 3 and 5, respectively, for various deformation speeds while Fig. 4 gives the number and extent of microcracks as a function of deformation speed for EI10 steel. For alloy A the mechanical-property results for a constant deformation speed are tabulated (Table 2). Fig. 7 shows the ratio of true resistance to fracture:tensile strength as a function of temperature for various deformation speeds. In all alloys formation of intercrystalline cracks at high deformation speeds begins at 450-500 °C. The damage from this cause increases with rising temperature and decreasing deformation speeds. The number, length and shape of cracks depend on the particular conditions. At maximum test speeds and

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Development of Intercrystalline Fracture at High Temperatures and the Plasticity of Steel

relatively low temperatures pore cracks are formed: when conditions lead to maximum reduction in plastic properties thin and long-sharp-ended cracks are formed. High-temperature plastic properties are directly linked with the extent of damage by intercrystalline disruption. The length of the average crack rises, with decreasing speed and increasing temperature, to a value close to the steel-grain diameter. The increase in plastic properties at test temperatures over 600 - 650 °C (for pearlitic) and 650-700 °C (for austenitic) is due to reduction in the intensity with which intercrystalline cracks develop. Intercrystalline disruption under these conditions is characterised by the formation of comparatively small thick blunt-ended cracks. There are 7 figures, 2 tables and 11 references: 4 Soviet, 5 English, 1 French and 1 German.

ASSOCIATION: Tsentral'nyy kotloturbinnyy institut im. I.I. Polzunova (Central Boiler-Turbine Institute im. I.I. Polzunov)

SUBMITTED: November 25, 1959

Card 3/3

LIBERMAN, L.Ya., kand. tekhn. nauk; STANYUKOVICH, A.V., kand. tekhn. nauk; red.; LEBEDEVA, N.I., red.; PODCHUFAROVA, S.I., red.; GROSMAN, L.A., red.; KOVAL'SKAYA, I.F., tekhn. red.

[Materials used in the manufacture of power machinery]Materialy, primeniaemye v energomashinostroenii. Moskva, TsINTIMASh, 1961. 181 p. (MIRA 16:4)
(Electric machinery industry--Equipment and supplies)
(Electric engineering--Materials)

18 8200 also 2708

22949
S/125/61/000/007/005/013
D040/D112

AUTHORS: Zemzin, V.N., and Stanyukovich, A.V.

TITLE: Tendency of welded joints in austenitic steel to local failures at the seam at high temperatures

PERIODICAL: Avtomaticheskaya svarka, no. 7, 1961, 46-53

TEXT: A new method for evaluating the tendency of austenitic-steel welded joints to local failures at the seam at high temperatures is described. The method was chosen after previous investigations for the reason that conventional mechanical strength tests do not reliably reveal the dangerous tendency of the welded structures of power equipment (particularly austenitic steam pipelines) to cracking when they are subjected to high temperatures for long periods. The test consists in bending with a constant deformation rate at high temperatures. Cylindrical specimens were cut from joints with welds of at least 50 mm, and installed in a special reverser in ЦНИМ-5 (TsIM-5) test machines designed by N.D. Zaytsev (Ref. 5: A.V. Stanyukovich and N.D. Zaytsev, "Zavodskaya laboratoriya", no. 9, 1959). The plasticity of the metal was evaluated according to the elongation of the external fibers in the middle of the specimen at the moment of crack appearance. Experiments were

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Tendency of welded joints...

were conducted at 500-800°C with deformation rates of 20, 0.60 and 0.067% per hour. Cracks formed mostly along the grain boundaries in the base metal, at a distance of one or two grains from the fusion line; the character of the cracks was exactly the same as in the case of welds in austenitic steel steam pipelines. The cracking tendency varied widely according to the grade of steel and the state of the joints (i.e. according to whether they had been welded or subjected to heat treatment). For 1X18H9T (1Kh18N9T) steel the most dangerous temperature range appeared to be 500-700°C; similar cracks formed in ЭИ405 (EI405), ЭИ257 (EI257) and ЭИ612 (EI612) steels, but at different temperatures and after varying degrees of elongation of the outer fibers before the cracking. The apparent cause of cracks are onsets of failures on the grain boundaries of the metal at the seam affected by the welding heat. Most of the tested joints lost their deformation capacity when the test temperature was raised, but already after 700-750°C the plasticity increased again in most joints. An abrupt drop of the intercrystalline bond at the seam upon heating during the welding had been stated in other investigations, too. The observed beneficial effect of austenization may be due to the disappearance of submicroscopic defects and redistribution of the intergrain layers or impurities on the grain boundaries. But austenization

Card 2/3

34621
S/659/61/007/000/008/044
D217/D303

18.8n0

AUTHOR: Stanyukovich, A.V.

TITLE: Estimating the deformability of high temperature materials

SOURCE: Akademiya nauk SSSR. Institut metallurgii. Issledovaniya po zharoprochnym splavam, v. 7, 1961, 78 - 96

TEXT: A method for estimating the deformability of heat-resistant materials by constant-rate deformation tests is suggested. It was found that the temperature-dependence of plasticity characteristics at constant rates of deformation when plotted within semi-logarithmic coordinates, is described by a V-shaped curve. Decreasing the rate of deformation displaces this curve in the direction of lower temperatures. With the help of a family of V-shaped curves, obtaining by testing a series of specimens and using several constants, the dependence of the minimum deformability of steel on temperature can be found. The minimum deformability increases with increase in temperature. The relationship between percentage elongation and ra-

Card 1/3

Estimating the deformability of ...

te of deformation at constant temperature follows a discontinuous function until the minimum deformation is attained. Having reached the level of minimum plasticity, a further decrease in the rate of deformation raises the percentage elongation. The degree of decrease in plasticity on fracturing, with a decrease in the rate of deformation, increases with rise in temperature up to a certain limit and then decreases again. Deformability increases at the maximum testing temperatures. Increase in temperature displaces the brittle range in the direction of high rates of deformation. The decrease in plasticity of steels at high temperatures is due to intercrystalline destruction. The total number of cracks per unit surface area of the section and the length of these cracks increases with a rise in temperature or a decrease in the rate of deformation. At a constant rate of deformation, the proportion of intercrystalline destruction increases, and the plastic properties decrease up to a certain temperature limit, the critical temperature. The latter is higher for greater rates of deformation. At temperatures above the critical, the proportion of intercrystalline destruction decreases simultaneously with the increase in plastic properties, and the cracks change their appearance, their sharp ends becoming blunt. The

Card 2/3

STANYUKOVICH, A.V., kand.tekhn.nauk; LEVIN, Ye.Ye., kand.tekhn.nauk

Causes of the deterioration of steam superheaters made from 1X18N12T steel. Energomashinostroenie 7 no.10:27-30 O '61. (MIRA 14:10)

(Steel, Heat resistant--Brittleness)
(Steampipes--Testing)

ZEMZIN, V.N.; STANYUKOVICH, A.V.

Tendency of welded joints in austenite steels toward local rupture under the effect of high temperatures. Avtom.svar. 14 no.7:46-53 Jl '61. (MIRA 14:7)

1. TSentral'nyy nauchno-issledovatel'skiy kotloturbinnyy institut im. I.I.Polzunova.
(Steel--Welding) (Welding--Defects)

STANYUKOVICH, A.V., kand.tekhn.nauk

Anisotropy of the plasticity of Kh18N9T steel at high temperatures. Metalloved. i term. obr. met. no.7:57-63 Jl '62. (MIRA 15:6)

1. TSentral'nyy nauchno-issledovatel'skiy kotloturbinnyy institut imeni I.I. Polzunova.
(Chromium-nickel steel--Testing)
(Metals at high temperatures)

S/659/62/008/000/024/028
I048/I248

AUTHOR: Stanyukovich, A.V.

TITLE: Examples of the application of constant-strain-rate tests for the evaluation of the performance of refractory materials

SOURCE: Akademiya nauk SSSR. Institut metallurgii, Issledovaniya po zharoprochnym splavam. v.8. 1962. 184-192

TEXT: Tests at a constant strain rate combined with microstructural examination of the fracture surface, related the plasticity of refractory materials with temperature to evaluate their performance under working conditions. Welded austenitic steel tubes were subjected to bend tests at 500-900°C the strain rates being 6.7×10^{-2}, 6.7×10^{-1}, and 20%/hr. In most cases the first cracks appeared within the area adjacent to the weld. The plasticity of steels ЭИ 612 (EI 612) and ЭИ 405 (EI 405) decreased sharply with increasing temperature within the range studied; the plasticity of steel

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S/659/62/008/000/024/028
I048/I248

Examples of the application...

depth of thread; the elongation decreased with strain rate, due to intercrystalline failure at the lower strain rates. The threads are weakened by defects at the grain boundaries, and by the generation of local stresses during the threading. There are 4 figures.

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S/032/62/028/011/010/015
B104/B102

AUTHORS: Stanyukovich, A. V., and Chizhik, A. A.

TITLE: Test of specimens with spiral grooves at high temperatures

PERIODICAL: Zavodskaya laboratoriya, v. 28, no. 11, 1962, 1361 - 1367

TEXT: It is suggested that the sensitivity of heat-resisting Cr-Ni-Mo alloys to stress concentrators may be estimated by determining and comparing the relative elongations δ_T of smooth specimens and of specimens having two spiral grooves (Fig. 1), stretched at constant rates (313, 0.8, and $8 \cdot 10^{-2}$ %/hr) until cracks appear, and by determining the elongation δ_p up to the moment when fracture occurs under constant load. With this in view, experiments were carried out at temperatures between 500 and 1000°C. It was found that, when the rate of deformation is reduced, the reduction in deformability attributable to the presence of a spiral groove, is similar to the reduction occasioned in smooth specimens by variations in the plasticity of the material under test: i.e., cracking is hastened as deformation is slowed. Plasticity diagrams (Fig. 5) reveal

Card 1/2

STANYUKOVICH, A.V.

Investigating the effect of stress concentration on the deformability of heat-resistant alloys. Issl. po zharoproch. splav. 10:93-102 '63.
(MIRA 17:2)

STANYUKOVICH, A.V., kand. tekhn. nauk

Collection of papers No.9 of the Leningrad Metalworking Plant (22d Congress of the CPSU) "Properties of materials used in turbine manufacture and methods for testing them" published by the State Scientific and Technical Publishing House of Literature on Machinery. Energomashinostroenie 10 no.2:48 F '64. (MIRA 17:6)

L 47142-66 EWT(m)/EWP(w)/T/EWP(t)/ETI IJP(c) JD

ACC NR: AR6000730 SOURCE CODE: UR/0124/65/000/009/V078/V079

42
41
B

AUTHORS: Stanyukovich, A. V.; Nikitin, V. I.

TITLE: Evaluation of fatigue resistance of steels in elastic-plastic regions at high temperature

18

SOURCE: Ref. zh. Mekhanika, Abs. 9V664

REF SOURCE: Sb. Vopr. mekhan. ustalosti. M., Mashinostroyeniye, 1964, 220-225

TOPIC TAGS: ~~steel~~, austenitic steel, fatigue test, fatigue strength, plastic deformation, YIELD STRESS, MATERIAL FRACTURE

ABSTRACT: The results of experiments are presented on fatigue at high temperature (700°) and symmetric periodic changes in deformation with low frequencies (20 min^{-1}) in the elastic-plastic region. Tests were made with rings of uniform deflection resistance, prepared from three austenitic nickel-chromium steels with differing yield stresses. The dependence of the logarithm of the number of cycles up to fracture on the logarithm of deformation after a cycle for the various steels is represented by parallel straight lines. With identical amplitudes the general deformation of the steel with the higher yield stress sustained a larger number of cycles without fracture. For equal amplitudes plastic deformation of fatigue resistance is higher for the steels having the lower limit in yield stress. The experiments show that the longer the material remains unfractured the larger the general plastic

Card 1/2

STANYUKOVICH, A.V.

Regularities of the manifestation of a tendency toward brittle failure in steel at high and low temperatures. Metalloved. i term. obr. met. no.7:2-7 Jl '64. (MIRA 17:11)

1. TSentral'nyy nauchno-issledovatel'skiy i proyektno-konstruktorskiy kotloturbinnyy institut imeni I.I. Polzunova.

L 21819-66 EPF(n)-2/EWA(h)/EWT(m)/T/EWA(d)/EWP(w)/EWP(t) IJP(c)
ACC NR: AT6008658 EM/WW/ (N) JD/HW/JG/ SOURCE CODE: UR/0000/65/000/000/0147/0156
GS

AUTHORS: Stanyukovich, A. V. (Leningrad); Chizhik, A. A. (Leningrad)

ORG: none

TITLE: The effect of various factors on the sensitivity of refractory materials to stress concentration at high temperatures

SOURCE: Vsesoyuznoye soveshchaniye po voprosam staticheskoy i dinamicheskoy prochnosti materialov i konstruktsionnykh elementov pri vysokikh i nizkikh temperaturakh, 3d. Termoprochnost' materialov i konstruktsionnykh elemento (Thermal strength of materials and construction elements); materialy soveshchaniya. Kiev, Naukova dumka, 1965, 147-156

TOPIC TAGS: stress concentration, high temperature metal, steel, alloy, pearlite steel, austenite steel, chromium steel/ EI802 chromium steel, 1Kh18N9T chromium steel

ABSTRACT: The effect of the cut geometry, temperature, and rigidity of the stressed state on the sensitivity of refractory materials to stress concentration is studied. Specimens with a spiral cut were tested (see Fig. 1). The testing method and

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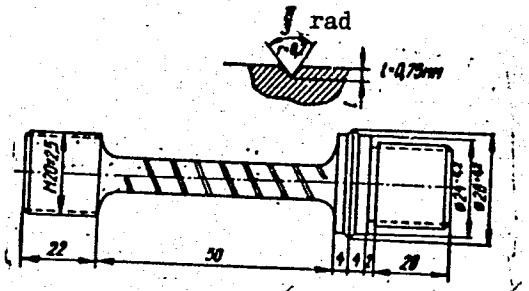

Fig. 1. Specimen with a spiral cut.

certain similar results were published earlier by the authors (Zavodskaya laboratoriya, 1962, No. 11). Samples of 12Kh1MF, 1Kh18N9T, EI10, EI612, and EI802 steels and Cr-Ni-Co and Fe-Cr-Ni-Mn alloys were tested at temperatures to 1200K (see Fig. 2).

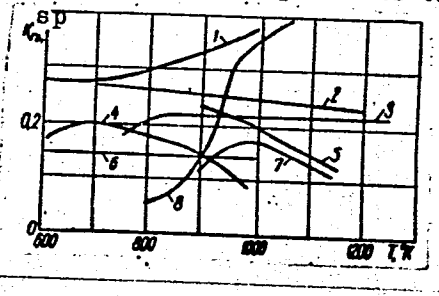

Fig. 2. Change of the coefficient of sensitivity to spiral cut with respect to plasticity k_T^{sp} as a function of temperature: 1 - 12Kh1MF; 2 - 1Kh18N9T; 3 - Cr-Ni-Co; 4 - EI10; 5 - EI612; 6 - EI802; 7 - Fe-Cr-Ni-Mn; 8 - 1Kh18N9T 18% cold-hardened.

L 21819-66
ACC NR: AT6008658

The pearlite steels showed high deformability at 823K. Chromium steel EI802 has greater workability than 1Kh18N9T, which is less plastic at high temperatures. The high-strength austenite steels showed an especially sharp reduction in plasticity with intercrystalline breakdown and the action of a concentrator. Orig. art. has: 4 formulas, 5 graphs, 1 diagram, and 1 table.

SUB CODE: 20, 11/ SUBM DATE: 19Aug65/ ORIG REF: 006

Card 3/3

ACC NR: AT7006337 (N) SOURCE CODE: UR/3196/66/000/069/0109/0118

AUTHOR: Stanyukovich, A. V. (Doctor of technical sciences)

ORG: none

TITLE: The influence of grain size on the deformation ability of pearlite steel 25KhlMF (EI10)

SOURCE: Leningrad. Tsentral'nyy nauchno-issledovatel'skiy i proyektno-konstruktorskiy kotloturbinnyy institut. Trudy, no. 69, 1966. Issledovaniye materialov dlya energeticheskikh ustanovok (Investigation of materials for power plants), 109-118

TOPIC TAGS: metallurgic research, steel, pearlite steel, metal test/ 25KhlMF steel, EI10 steel

ABSTRACT: The effect of grain size on the long-term stability and deformability of steel 25KhlMF (EI10) was investigated. The investigation was undertaken to determine the cause for the failure of a number of steel boiler collars used in the Pridenprovsk GRES. The investigation supplements the results obtained by A. M. Parshin and Yu. V. Kolosov (Trudy LPI im M. I. Kalinina, Mashinostroyeniye, Mashgiz, 1961). The mechanical properties and microstructure were investigated for collars with diameters of 36 mm, length of 770--1600 mm, and curvature radius of 185--210 mm. The experimental results are summarized in graphs and tables (see Fig. 1). It was found that plastic deformation suffered by the outer fibers of the collar may be

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ACC NR: AT7006337

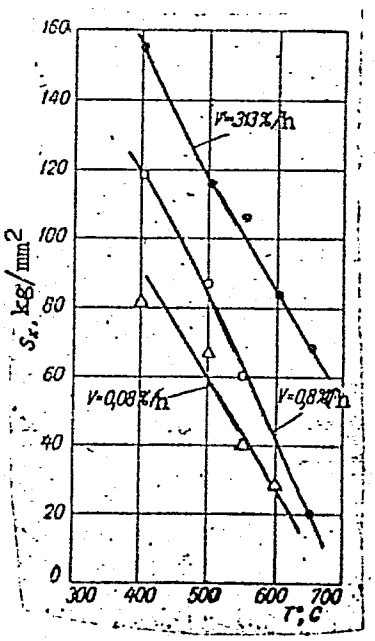

Fig. 1. Change in the true strength of steel 25KhlMF (EI10) with coarse-grained structure as a function of temperature. V - % deformation per hour

represented by the equation

$$\delta = \frac{\Delta}{2}\left(\frac{1}{R_1} - \frac{1}{R_2}\right) 100\%,$$

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ACC NR: AT7006337

where Δ is the diameter of the rod, and R_1 and R_2 are the radius of curvature before and after use, respectively. It is concluded that the presence of coarse-grained structure lowers the impact viscosity of the steel and leads to a sharp increase in the tendency to brittleness. Orig. art. has: 3 tables, 7 graphs, and 1 equation.

SUB CODE: 11/ SUBM DATE: none/ ORIG REF: 008/ OTH REF: 001

Card 3/3

STANYUKOVICH, K. P.

"Application of Certain Empirical Relations to the Study of Meteors."
Astronomicheskiy zhurnal Vol 10, No. 4, 1933, pages 457-463.

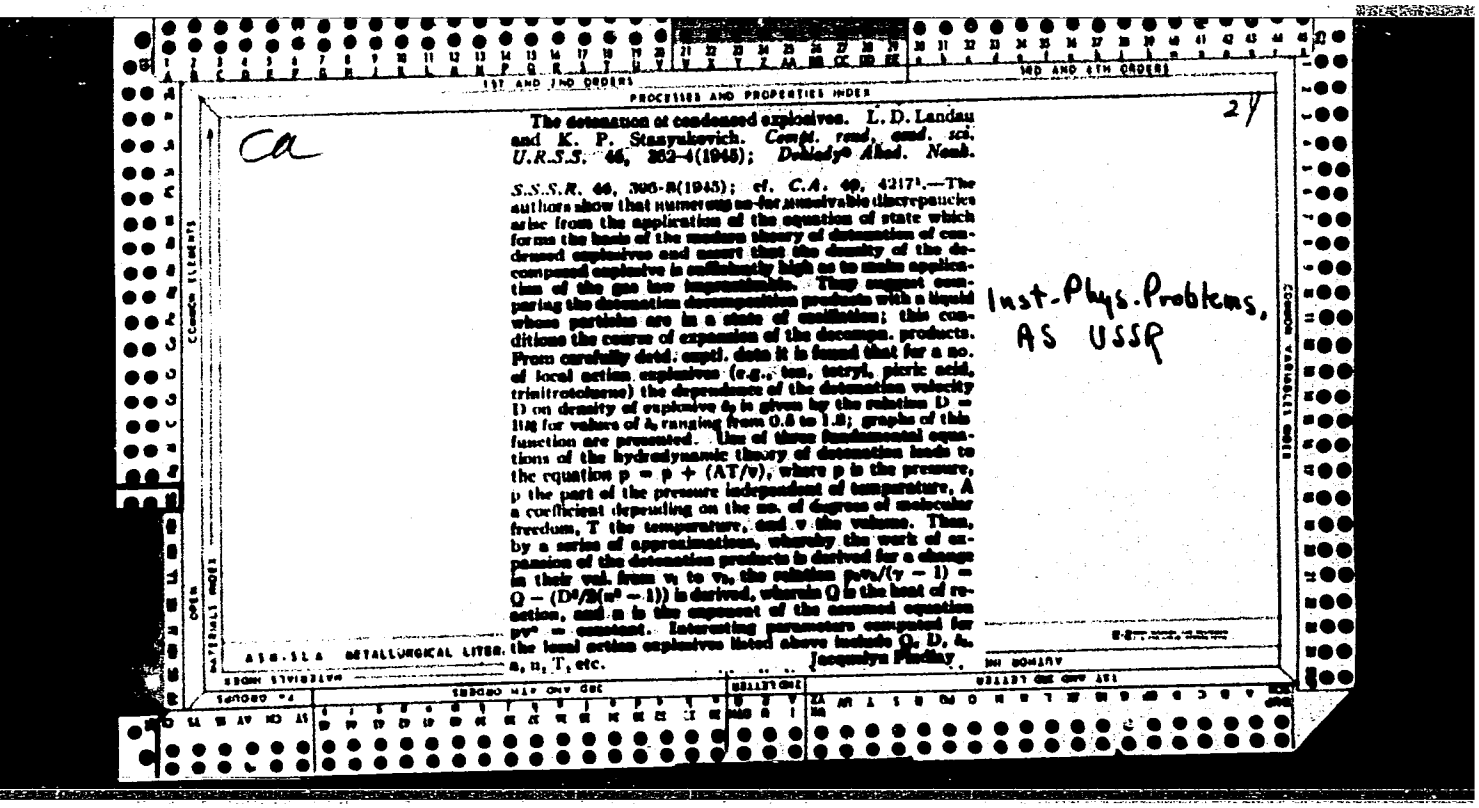
Translation 563974

STANYUKOVICH, K. P. and FEDYNSKIY, V. V.

"Results of the Photographic Study of a Bright Meteor." Astron. Zhur., Vol. 12, No. 5(1935), pp. 440-449

STANYUKOVICH, K. P. and Pokrovskiy, G. I.

"Elements of a Directed Blast," report given at the General Assemblies of the OFMN in 1944. Iz. Akad. Nauk, Ser. Fiz., Vol. IX, No. 3, 1945



PROCESSES AND PROPERTIES INDEX

Ca

The detonation of condensed explosives. L. D. Landau and K. P. Stanyukovich. *Compt. rend. acad. sci. U.R.S.S.* 46, 362-4(1945); *Doklady° Akad. Nauk. S.S.S.R.* 46, 395-8(1945); cf. *C.A.* 40, 4217¹.—The authors show that numerous no-for-measurable discrepancies arise from the application of the equation of state which forms the basis of the modern theory of detonation of condensed explosives and assert that the density of the decomposed explosive is sufficiently high as to make application of the gas law impermissible. They suggest comparing the detonation decomposition products with a liquid whose particles are in a state of oscillation; this conditions the course of expansion of the decomps. products. From carefully detd. empirl. data it is found that for a no. of local action explosives (e.g., tetr, tetryl, picric acid, trinitrotoluene) the dependence of the detonation velocity D on density of explosive Δ_0 is given by the relation $D = 1lg$ for values of Δ_0 ranging from 0.8 to 1.8; graphs of this function are presented. Use of three fundamental equations of the hydrodynamic theory of detonation leads to the equation $p = p + (AT/v)$, where p is the pressure, p the part of the pressure independent of temperature, A a coefficient depending on the no. of degrees of molecular freedom, T the temperature, and v the volume. Then, by a series of approximations, whereby the work of expansion of the detonation products is derived for a change in their vol. from v_1 to v_2, the relation $p^n v_2/(\gamma - 1) = Q - (D^2/8(n^2 - 1))$ is derived, wherein Q is the heat of reaction, and n is the exponent of the assumed equation pv^n = constant. Interesting parameters computed for the local action explosives listed above include Q, D, Δ_0, a, n, T, etc.

Jacqueline Findlay.

Inst-Phys.Problems, AS USSR

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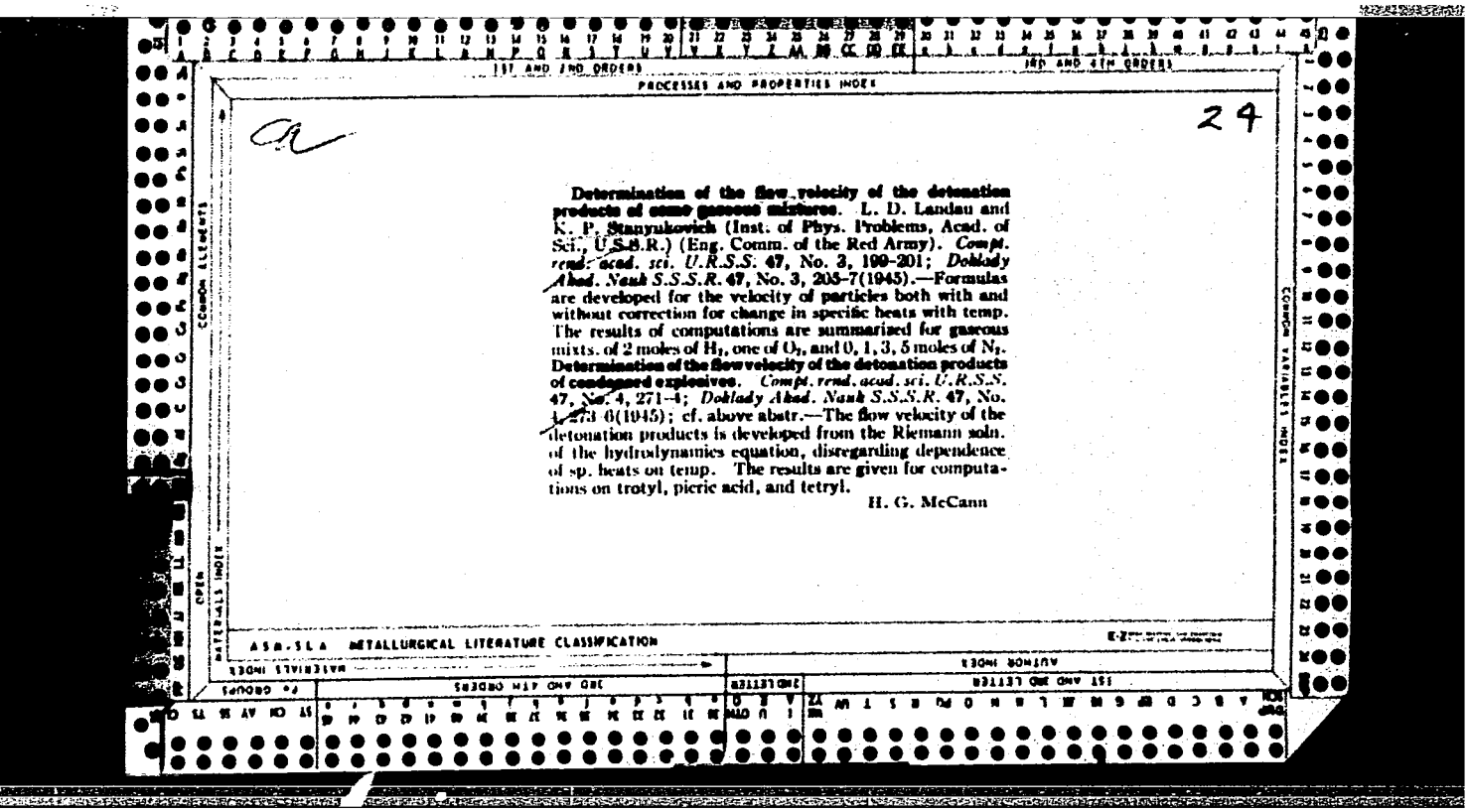
A.S.T.I.A. METALLURGICAL LITER.



1ST AND 2ND ORDERS

PROCESSES AND PROPERTIES INDEX

24

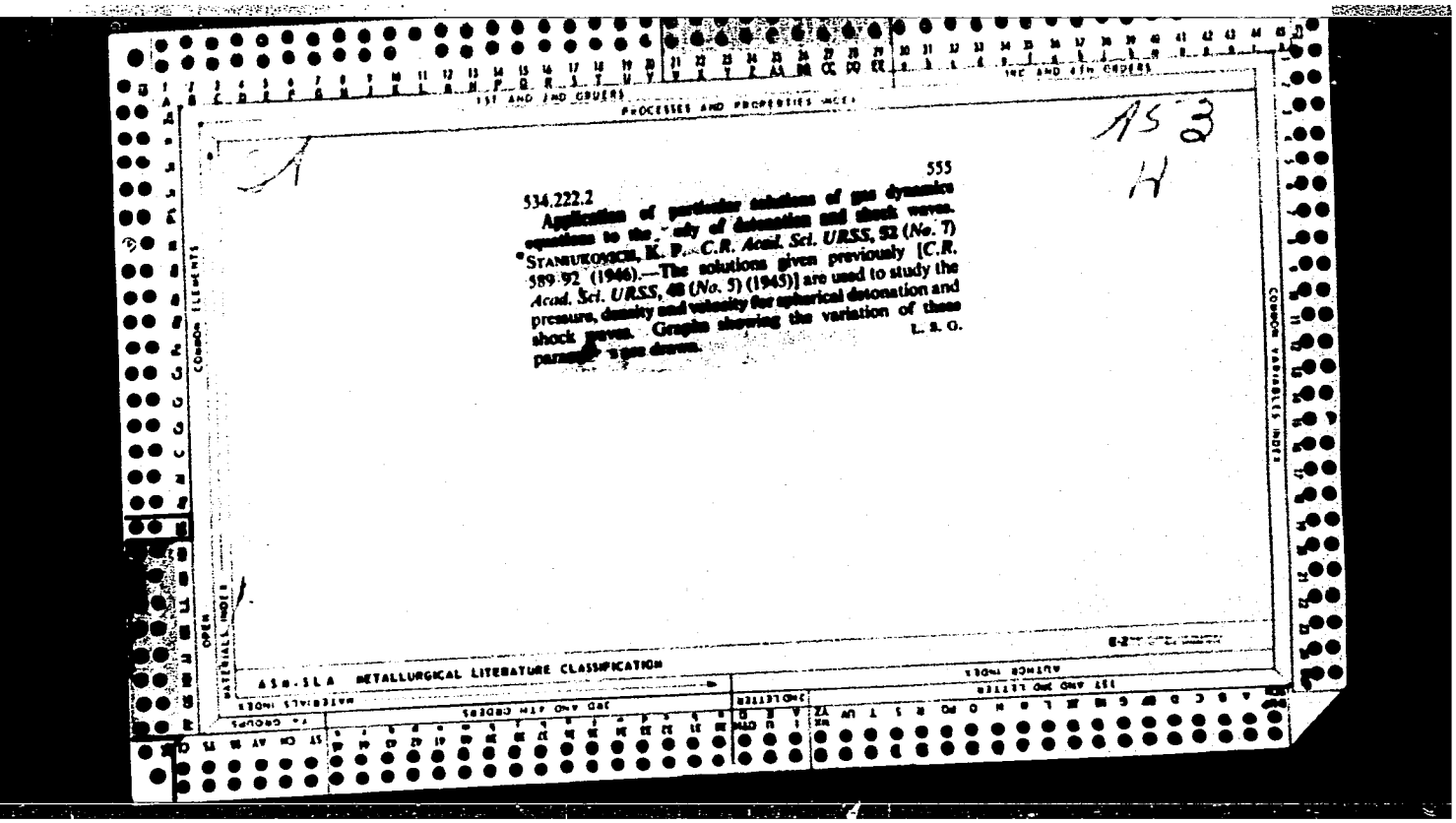
Determination of the flow velocity of the detonation products of some gaseous mixtures. L. D. Landau and K. P. Stanyukovich (Inst. of Phys. Problems, Acad. of Sci., U.S.S.R.) (Eng. Comm. of the Red Army). *Compt. rend. acad. sci. U.R.S.S.* 47, No. 3, 199–201; *Doklady Akad. Nauk S.S.S.R.* 47, No. 3, 203–7(1945).—Formulas are developed for the velocity of particles both with and without correction for change in specific heats with temp. The results of computations are summarized for gaseous mixts. of 2 moles of H_2, one of O_2, and 0, 1, 3, 5 moles of N_2. **Determination of the flow velocity of the detonation products of condensed explosives.** *Compt. rend. acad. sci. U.R.S.S.* 47, No. 4, 271–4; *Doklady Akad. Nauk S.S.S.R.* 47, No. 4, 273–6(1945); cf. above abstr.—The flow velocity of the detonation products is developed from the Riemann soln. of the hydrodynamics equation, disregarding dependence of sp. heats on temp. The results are given for computations on trotyl, picric acid, and tetryl.

H. G. McCann

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

[redacted]ZEL'DOVICH, Ya. B.

"On Automodel Solutions of Equations of Hydrodynamics Possessing Central Symmetry," Dok AN SSSR 46, No 5, 1945.



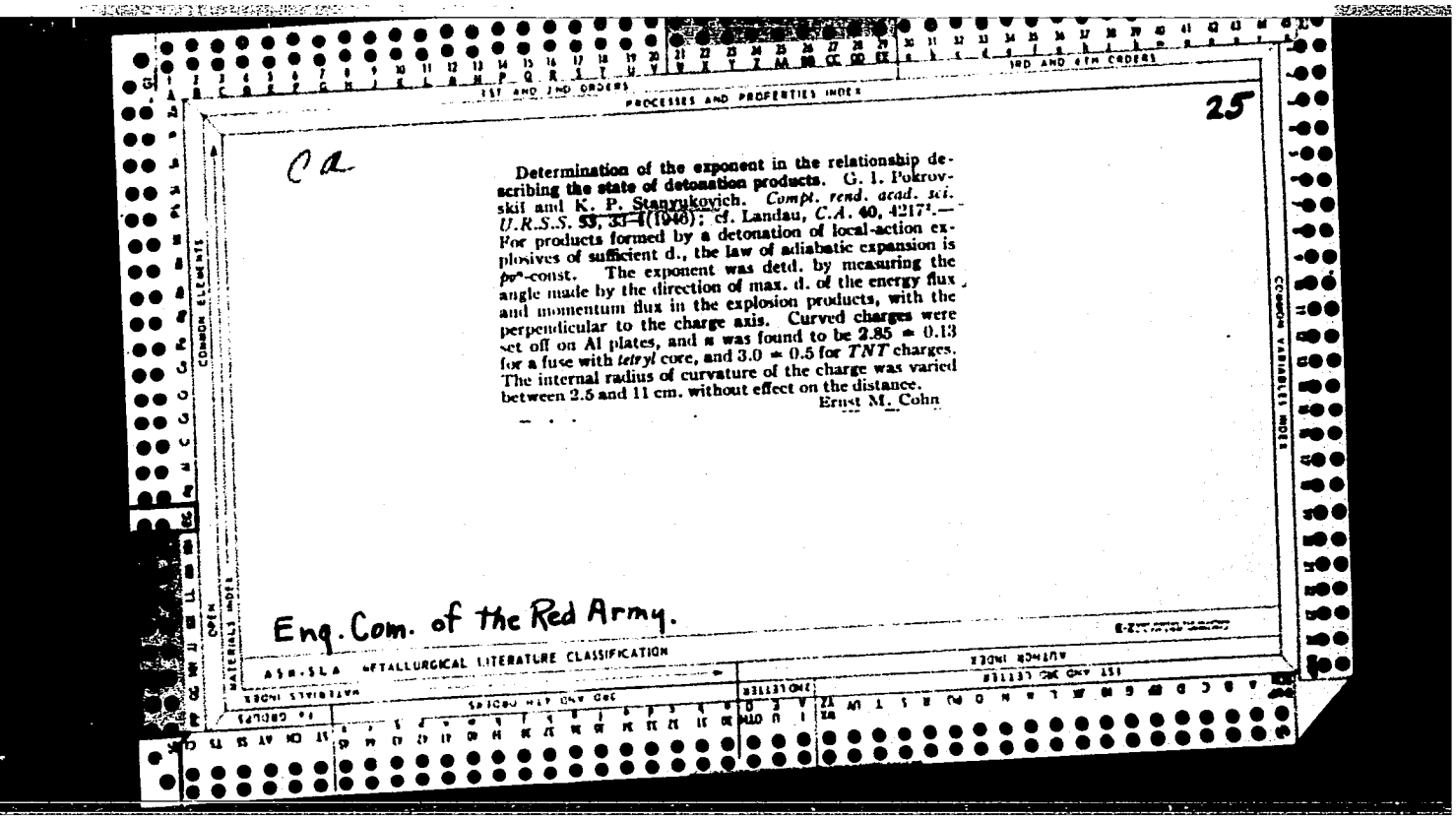
555

534.222.2

Application of particular solutions of gas dynamics equations to the theory of detonation and shock waves. *Stanukovich, K. P. *C.R. Acad. Sci. URSS*, 52 (*No.* 7) 589-92 (1946).—The solutions given previously [*C.R. Acad. Sci. URSS*, 48 (*No.* 5) (1945)] are used to study the pressure, density and velocity for spherical detonation and shock waves. Graphs showing the variation of these parameters are drawn. L. S. G.

STANYUKOVICH, K. P.

"On the Reflection of a Detonati Wave Front," Comptes Rendus (Doklady), Vol 52, No 9, 1946



PROCESSES AND PROPERTIES INDEX

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Ca

Determination of the exponent in the relationship describing the state of detonation products. G. I. Pokrovskiĭ and K. P. Stanyukovich. *Compt. rend. acad. sci. U.R.S.S.* **53**, 31–4(1946); cf. Landau, *C.A.* **40**, 4217⁸.—For products formed by a detonation of local-action explosives of sufficient d., the law of adiabatic expansion is pv^n-const. The exponent was detd. by measuring the angle made by the direction of max. d. of the energy flux and momentum flux in the explosion products, with the perpendicular to the charge axis. Curved charges were set off on Al plates, and n was found to be 2.85 ± 0.13 for a fuse with *tetryl* core, and 3.0 ± 0.5 for *TNT* charges. The internal radius of curvature of the charge was varied between 2.5 and 11 cm. without effect on the distance.
Ernst M. Cohn

Eng. Com. of the Red Army.

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION

AMR

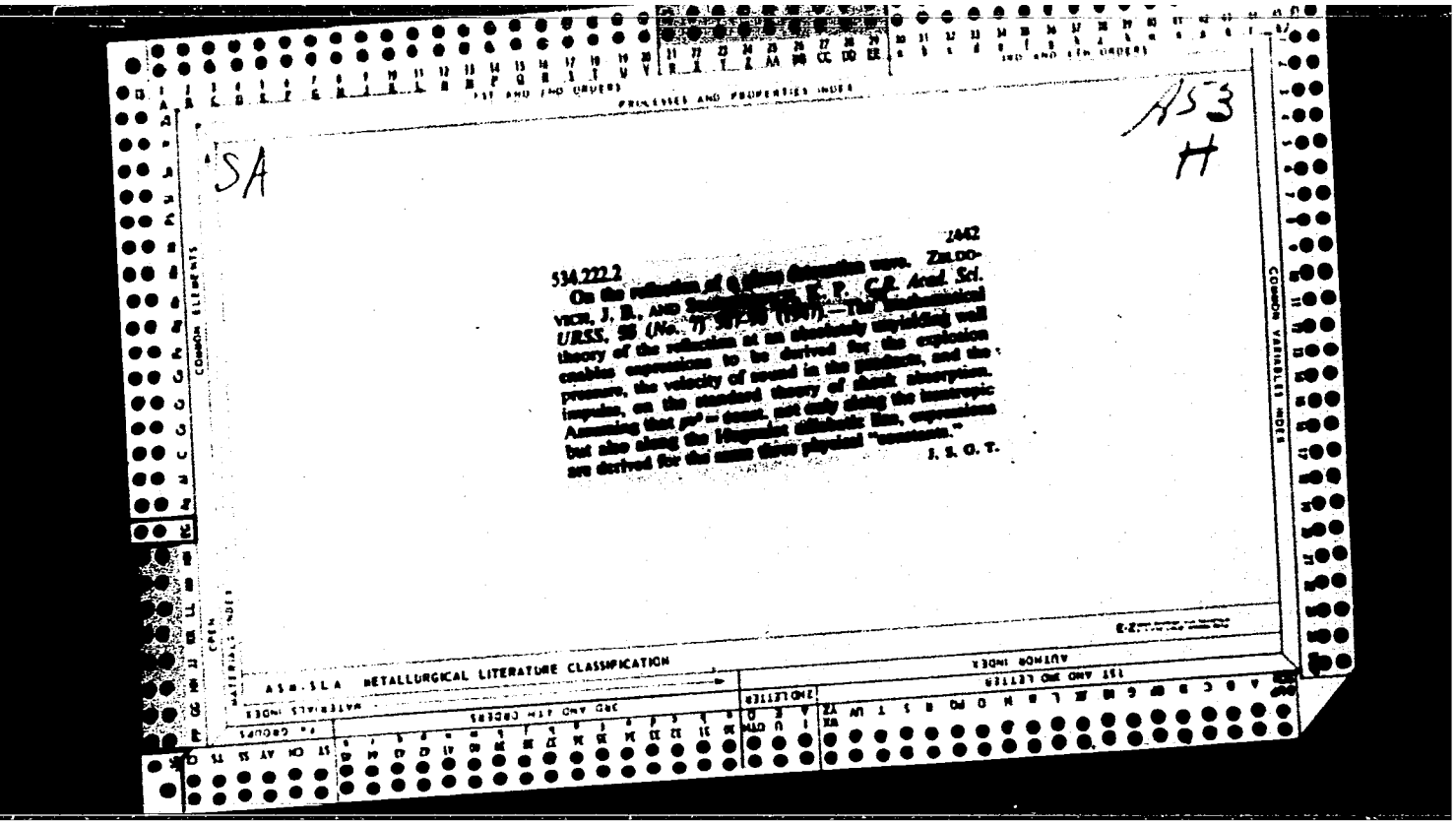
Compressible Flow, Gas Dynamics 7

342. K. P. Stanjukovich. "The flow of detonation products in the case of an 'inclined' detonation wave" (in English). *C. R. Acad. Sci. URSS*, Feb. 10, 1947, vol. 55, no. 4, pp. 311-314.

The plane front of a detonation wave is assumed to move along the plane boundary of a charge, the angle α between these two planes remaining constant. The author apparently assumes a charge burning off at the same rate as the wave proceeds. In a system moving with the wave, the flow of the detonation products is described as a Prandtl-Meyer flow into vacuum around the instantaneous edge of the charge. This idea is carried out under the assumption that $c_1 = Du/(n+1)$, where c_1 is the initial velocity of sound, D is apparently the detonation velocity, and $n = c_p/c_v$.

Curves showing the angular distribution of the energy of the detonation products are presented for the cases $\alpha = 45°, 90°$ together with $n = 1.4, 3.0$. Each of them shows a sharp peak, at a certain angle of back-scattering which depends on α and n. Good agreement is claimed with experiments which were made especially for the purpose. The paper is difficult to read because the notations are not sufficiently explained. G. Kuerti, USA

JAE 48



STANYUKOVICH, K.P

ZEL'DOVICH, IAKOV BORISOVICH, and K. P. STANYUKOVICH.

Ob otrazhenii ploskoi detonatsionnoi volny. (Akademiia Nauk SSSR. Doklady. Novaia seriia, 1947, v.55, no. 7, p. 591-594, diagrs.)

Title tr.: On the reflection of a plane detonation wave.

Also published in English in Comptes rendus de l'Académie des Sciences de l'URSS. Nouvelle série, 1947, v.55, no.7, p. 587-590 (Q60.A52)

AS262.S3663 v.55

SO: Aeronautical Sciences and Aviation in the Soviet Union, Library of Congress, 1955.

STANYUKOVICH, K P.

Jul 1947

Astronomy

"Destructive Action of Meteorite Blows," K. P. Stanyukovich, V. V. Fedynskiy, 4 pp

"Dok Akad Nauk SSSR, Nova Ser" Vol LVII, No 2

Larger planets of the solar system are subjected to constant bombardment by meteorites that hit planets at terrific speeds and result in a slight destructive action. Presents formulas for calculating destructive action of meteorites hitting earth. Submitted by Academician N. N. Semenov, 14 May 1947.

Translation 563375

60T102

STANYUKOVICH, K. P.

PA 49T91

USSR/Physics
Gas Flow
Gas Pressure

Oct 1947

"Two-Way Discharge of a Gas from Cylindrical Container Into Pipe," K. P. Stanyukovich, 4 pp

"Dok Akad Nauk SSSR, Nova Ser" Vol LVIII, No 2

Discusses one of more frequently met problems in the field of gas dynamics: when a gas is discharged from cylindrical container of length l into pipe in both directions, why is it that the discharge does not begin simultaneously? In primary state the gas is passive, but its pressure and density constant. Presents formula showing reasons for this phenomenon of

[redacted] 49T91

USSR/Physics (Contd) Oct 1947

uneven flow of gas from container to pipe. Submitted by Academician M. V. Keldysh, 5 Apr 1947.

[redacted] 49T91

STANYUKOVICH, K.P.

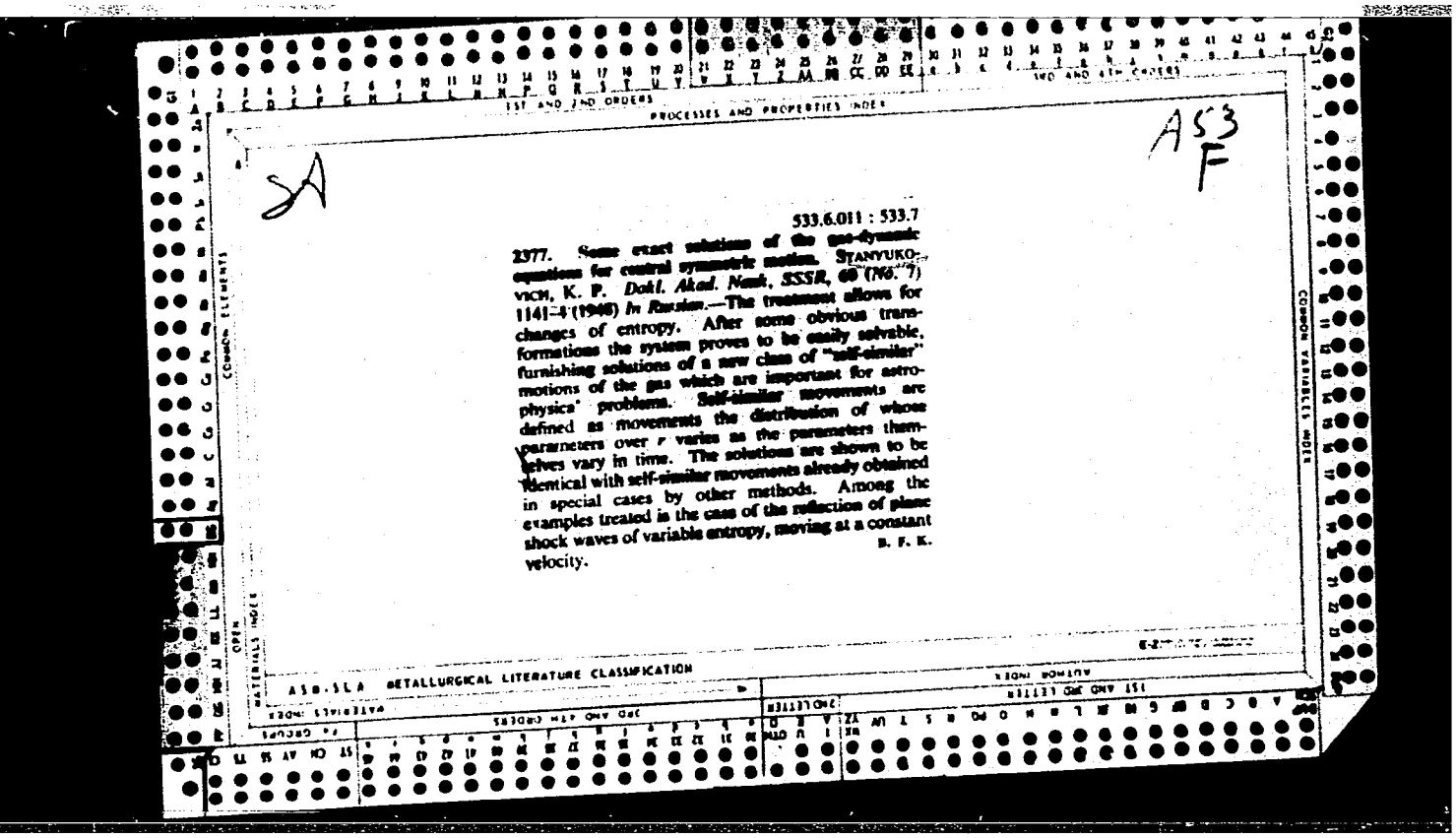
USSR/Physics Nov 1947
Charges, Linear
Detonation - Effects

"Movement of a Particle of the Products of Detonation of a Linear Charge," K. P. Stanyukovich, 4 pp

"Dok Ak Nauk" Vol LVIII, No 5

Much interest is shown in the study of particles of the products of detonation of any charge after the occurrence in it of detonation waves as well as during its dispersion. Author discusses methods whereby it is possible to determine simply and with a fair degree of accuracy the movement of particles of products of detonation in close proximity to the actual explosion. Submitted by Academician N. N. Semenov, 4 May 1947.

38T100



533.6.011 : 533.7

2377. **Some exact solutions of the gas-dynamic equations for central symmetric motion.** STANYUKOVICH, K. P. *Dokl. Akad. Nauk, SSSR, 69 (No. 7)* 1141–4 (1946) *In Russian.*—The treatment allows for changes of entropy. After some obvious transformations the system proves to be easily solvable, furnishing solutions of a new class of "self-similar" motions of the gas which are important for astrophysical problems. Self-similar movements are defined as movements the distribution of whose parameters over r varies as the parameters themselves vary in time. The solutions are shown to be identical with self-similar movements already obtained in special cases by other methods. Among the examples treated is the case of the reflection of plane shock waves of variable entropy, moving at a constant velocity.

B. F. K.

USSR/Physics Jul 48
Astronomy
Mathematics, Applied

"The Problem of Angular Moment of Momentum of Planets in the Solar System," K. P. Stanyukovich, 3 3/4 pp

"Dok Ak Nauk SSSR" Vol LXI, No 2

Explains significance of subject for cosmogony theories. Obtains equation for mass of gas thrown from a cylinder of uniform section. Evaluates this equation and applies result to case of gas thrown out from a star. Submitted 10 May 48.

11/49T98

STANYUKOVICH, K.

Stanyukovich, K. and Fedynskiy, V. - "In the spaces of the universe," (Galactics), Molodoy bol'shevik, 1949, No. 7, p.62-69, - Bibliog: 6 items.

SO: U-3736, 21 May 53, (Letopis 'Zhurnal 'nykh Statey, No. 17, 1949).

STANYUKOVICH, K.P.

Stanyukovič, K. P. Automodels of plane and axisymmetric steady motion of a gas. Doklady Akad. Nauk SSSR (N.S.) 64, 29–32 (1949). (Russian)

The author treats families of steady flows of a compressible fluid which fall under his automodel specification. A flow is termed "automodel" if the solution depends essentially upon a suitably chosen single independent parameter which is itself a function of the originally specified independent variables. In the cases investigated the restriction to plane or axi-symmetric flow is made at the outset. No a priori specification is made as to irrotationality or isentropy. Prandtl-Meyer flow and the conical flow of Busemann [Z. Angew. Math. Mech. 9, 496–498 (1929)] are obtained as special cases. Some more general solutions are obtained in the form of unsolved differential equations. Finally, it is noted that for the most general case of steady spatial flows it is impossible to find automodel solutions which depend on only one parameter. *W. D. Hayes* (Providence, R. I.).

Source: Mathematical Reviews, Vol 10, No. 10.

LFH

STANYUKOVICH, K. P.
Applied Mechanics
Reviews

111. K. P. Stanyukovich, Self-similar flows of a ponderable gas (in Russian), Doklady Akad. Nauk SSSR 61, 467-470 (Feb. 1949). Compressible Flow, Gas Dynamics

The equations for spherical waves in a compressible ponderable medium are written in the form

$$r^{-2}[r^2(u_t + uu_r + pr/\rho]_r + 4\pi G\rho = 0,$$

$$(\log \rho)_t + u(\log \rho)_r + u_r + 2u/r = 0,$$

$$(\log p)_t + u(\log p)_r + k(u_r + 2u/r) = 0,$$

where p is the pressure, ρ density, u radial velocity, G the gravitational constant, and k the ratio of specific heats. The following types of "automodel motions" (corresponding to what is called "progressing waves" in Courant and Friedrich's *Supersonic Flow and Shock Waves*, New York, 1948) are investigated:

(1) $u = xr/t$; $p = y\rho r^2/t^2$. Partial differential equations are obtained for x, y and ρ; these are transformed into ordinary differential equations by assuming that x, y and $\eta = \rho t^2$ are functions of the single variable $z = rt^{-\alpha}$. The special cases $z = t$, $z = r$ are considered.

(2) $u = r/t$. It is found that p and ρ become of the form Ar^m/t^n, with certain relations between the exponents and the factors A.

(3) $u = 0$. It follows that p and ρ are functions of r only. This leads to an equation of Emden's type for gaseous spheres.

(4) $u = xr$; $p = y\rho r^2$. A solution is sought in which x, y and ρ are functions of the single variable $z = re^{-\alpha t}$.

J. M. Burgers, Holland

STANYUKOVICH, K. P.

USSR/Physics Feb 49
Gas Flow
Mathematics, Applied

"Conformal Motion of Gas in a Gravitational Field,"
K. P. Stanyukovich, 4 pp

"Dok Ak Nauk SSSR" Vol LXIV, No 4

Mathematical treatment of various types of conformal motion in gases with allowance for its own inner gravitational field. Submitted 6 Dec 48.

27/49T101

STANYUKOVICH, K. P. STANYUKOVICH, K. P. PA 25/49T98

USSR/Physics Jan 49
Gas Flow
Mathematics, Applied

"Conformal Surfaces and Axisymmetrical Steady-State Flow of Gas," K. P. Stanyukovich, 3 pp

"Dok Ak Nauk SSSR" Vol LXIV, No 2

Strict mathematical treatment of subject. Submitted 10 Nov 48.

[redacted] 25/49T98

STANYUKOVICH, K.P.

Thermodynamics, Statistical Mechanics

Stanyukovič, K. P. On the increase of entropy in an infinite universe. Doklady Akad. Nauk SSSR (N.S.) 69, 793–796 (1949). (Russian)

Set-theoretical arguments are given to support the view that the second law of thermodynamics is not applicable to an infinite universe provided it contains denumerable infinite types of "particles". The latter concept includes atoms, molecules, stars, etc. *L. Tisza* (Cambridge, Mass.).

Source: Mathematical Reviews, Vol 12 No. 9

STANYUKOVICH, K. P.

"Elements of the Physical Theory of Meteors and Crater-Forming Meteorites," Ak. Nauk SSSR Meteoritika, No.7, 1950

Translation 56346
56347

STANYUKOVICH, K. P.

USSR/Astronomy - Cosmogony, Solar System May/Jun 52

"Problem of Origin of the Solar System," K. P. Stanyukovich

"Astron Zhur" Vol XXIX, No 3, pp 288-306

Author shows in his computations that the solar mass should have been 5-15 times greater and also its angular velocity 5-15 times higher in order to erupt gases in sufficient quantity for further formation of planets. In the case of such initial conditions, only 1/100 of the escaping gases

217T49

expanding in the direction of solar rotation will revolve on elliptic orbits, the remainder necessarily falling back on the sun. Received 12 Dec 51.

217T49

USSR/Astronomy - Astronomers Jul/Aug 52

"Fourth Plenum of the Commission on Comets and Meteors and the Commission on Planetoids of the Astronomical Council of the Academy of Sciences USSR," K. Stanuykovich, V. Fedzynskiy

"Astron Zhur" Vol 29, No 4, pp 505-508

A meeting of the Commission on Comets and Meteors and the Commission on Asteroids was held 6 - 8 Dec 51 in Kiev. Thirty representatives of astronomical observatories attended. Prof V. V. Fedynskiy, Pres, Commission on Comets and

226T48

Meteors, opened the session. The main subject was S. K. Vsekhsvyatskiy's theory on the origin of comets as eruptions from planets. His theory met strong criticism.

226T48

STANUYKOVICH, K.

1. FEDYNSKAY, V. V., STANIUKOVICH, K. P.

2. USSR (600)

4. Astronomy - Congresses

7. Fourth plenum of the Committee on Comets and Meteors and of a committee on minor planets. Astron. tsir. no. 127, 1952.

9. Monthly List of Russian Accessions, Library of Congress, May 1953. Unclassified.

STANYUKOVICH, K. P.

Among the papers presented by the First All-Union Conference on Aerohydrodynamics (8-13 Dec 1952) convened by the Institute of Mechanics, Academy of Sciences USSR, was:

"Basic Mechanism of the Motion of a Gas in the Field of Gravity" by Stanyukovich, K. P. (Institute of Physical Problems, Academy of Sciences USSR)

SO: Izvestiya AN USSR, Otdeleniye Tekhnicheskikh Nauk, No. 6, Moscow, June 1953, (W-30662, 12 July 1954)

STANYUKOVICH, K.P.

New method of approximation for the integration of certain equations of the hyperbolic type. Dokl. AN SSSR 93 no.6:979-982 D '53. (MLRA 6:12)

1. Predstavleno akademikom M.V.Keldyshem.
(Integrals) (Differential equations, Partial)

STANYUKOVICH, K.P. Prof. Dr. Tech. Sci.

"Problemy mezhplanetnykh polet" (Problems of interplanetary flights), Krasnaya Zvezda, August 10, 1954, p. 3.
For translation, see Appendix VII.
900630z-V

Rand RM-1766 trans. 21 Jan 56 - in library #5

STANYUKOVICH, K.P.

"Raketa i ee budushchee" (The rocket and its future),
Krasnaya Zvezda, December 19, 1954, p. 3.
A review of the book Raketa by B. V. Lyapunov.

STANYUKOVICH, Kirill. P. Dr. Tech. Sci.

"Trip to the Moon: Fantasy and Reality," A Soviet Review of World Events, No.11, pp. 28-29, 1 Jun 1954

In English

STANYUKOVICH, K.P.

STANYUKOVICH, K.P.

Problem of the origin of meteorites (theses of a report). Metec-
ritika no.11:63 '54. (MLRA 8:3)
(Meteorites)

STANYUKOVICH, K.P., doktor tekhnicheskikh nauk.

The nature of gravity. Nauka i zhizn' 21 no.1:21-23 Ja '54. (MLRA 7:1)
(Gravity)

STANYUKOVICH, K.P.

VARVAROV, N.A.; DOBRONRAVOV, V.V., professor, doktor fiziko-matematicheskikh nauk; MERKULOV, I.A., inzhener-konstruktor; SERYAPIN, A.D., laureat Stalinskoy premii; STANYUKOVICH, K.P., professor, doktor tekhnicheskikh nauk; KHLEVTSEVICH, Yu.S., kandidat tekhnicheskikh nauk; SHTERNFEL'D, A.A., laureat mezhdunarodnoy pooshchritel'noy premii po astronavtike.

Enroute to the stars. Tekh.mol. 22 no.7:1-7 Jl '54.

1. Predsedatel' sektsii astronavtiki pri TSentral'nom aeroklube SSSR imeni Chkalova (for Varvarov). 2. Zamestitel' predsedatelia nauchno-tekhnicheskogo komiteta po kosmicheskoy navigatsii, sektsiia astronavtiki (for Dobronravov). 3. Predsedatel' nauchno-tekhnicheskogo komiteta po raketnoy tekhnike, sektsiia astronavtiki (for Merkulov). 4. Predsedatel' nauchno-tekhnicheskogo komiteta po biologii kosmicheskogo poleta, sektsiia astronavtiki (for Seryapin). 5. Chlen nauchno-tekhnicheskogo komiteta po astronomicheskim i fizicheskim problemam (for Stanyukovich), sektsiia astronavtiki.6. Predsedatel' nauchno-tekhnicheskogo komiteta po radio-teleupravleniyu (for Khlebtsevich), sektsiia astronavtiki. 7. Predsedatel' nauchno-tekhnicheskogo komiteta po kosmicheskoy navigatsii (for Shternfel'd), sektsiia astronavtiki. (Interplanetary voyages) (Space ships) (MLRA 7:6)

STANYUKOVICH, K. P. doktor tekhnicheskikh nauk.

The nature of gravity. Tekh.mol. 22 no.12:3-7 D '54. (MLRA 8:1)
(Gravity)

STANYUKOVICH, K. P.

"Silovye polya" (Fields of Force), Tekhnika-Molodezhi Vol. 22, No. 12, December, 1954, p. 8.

STANYUKOVICH, K. P.

3760 AEC-tr-3101
SOLVING THE EQUATIONS OF MAGNETIC GAS DYNAMICS FOR ONE-DIMENSIONAL MOVEMENT. (Resheniye Uravnenii Magnitogazodinamiki dlia Odnomernovo Dvijenlia). S. A. Kaplan and K. P. Stanlukovich. Translated by M. L. Weinreich from Doklady Akad. Nauk S.S.S.R. 95, 769-71 (1954). 6p.

It is shown that the problems concerning an arbitrary 1-dimensional non-stationary gas flow with an infinitely great conductivity in a magnetic field can be reduced to the usual one-dimensional problems of gas dynamics, obtaining sufficiently general and universal solutions. (M.H.R.)

Distr: 4E4f/4F1

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USSR

2425. Stanyukovich, K. P., General solutions of the equations of gas dynamics for one-dimensional motions for a certain given equation of state or process (in Russian), *Doklady Akad. Nauk SSSR (N.S.)* 96, 441–444, 1954.

Consider one-dimensional nonsteady flow with

$$p = (kA^2)^k(v - \sigma_1(h))^{-k}(h + h_0)^{1-2k}$$

and let $(\tau + \tau_0)(h + h_0) = 1$, $z = (\tau + \tau_0)p$, where p is pressure, v specific volume, $h = h(s)$ mass of the gas column from $x = 0$ to x, s entropy, σ_1 an arbitrary function of h, while k, A, h_0, and τ_0 are constants. Since the Lagrangian form of the equations of motion implies $\partial^2 z/\partial\tau^2 = A^2\partial[z^{-(k+1)/k}\partial z/\partial t]/\partial t$, define w by

$$\partial w/\partial t + \partial z/\partial\tau = 0, \quad \partial w/\partial\tau + A^2 z^{-(k+1)/k}\partial z/\partial t = 0 \qquad [*]$$

If $J = \partial(w, z)/\partial(t, \tau) \neq 0$, transform [*] by choosing w, z as independent, t, τ as dependent variables. Let $z = (\theta/A\alpha)^\alpha$, where $\alpha = 2k/(k - 1)$, and let $k = (2n + 3)/(2n + 1)$ for $n = -1, 0, 1, \ldots$. Then $t(\theta, w)$ satisfies a Euler-Darboux equation whose general solution in terms of derivatives of two arbitrary functions of $\theta \pm w$ is known, and τ can be found by a quadrature. After inversion to obtain $z(t, \tau)$, the particle velocity can also be found by a quadrature. The (simple wave) case $J \equiv 0$ is solved in a form involving an arbitrary function $F(z)$. The author suggests that by proper choice of A, h_0, and $\sigma_1(h)$, flows of this type may be used to approximate flows with shocks.

J. H. Giese, USA

BRONSHTEN, V.A; STANYUKOVICH, K.P., doktor tekhnicheskikh nauk, redaktor; GOLUBKOVA, V.A., redaktor.

[The universe; a collection] Vselennaia; sbornik. Moskva, Gos. izd-vo kul'turno-prosvetitel'noi lit-ry, 1955. 404 p. (MLRA 9:4)
(Cosmology)

STANYUKOVICH, Kirill Petrovich

Unsteady Motion of Continuous Media. New York, London, Pergamon Press, 1960.
745 p.
Translated from the original Russian: Neustanoviv skiyesya Dvizheniya Sploshnoy Sredy. Moscow, 1955.
Bibliography: p. 738-740.

STANYUKOVICH, K.P.

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1-(484 F)

★ Станюкович, К. П. [Stanyukovič, K. P.] Неустановившиеся движения сплошной среды. [Unsteady motion of a continuous medium.] Gosudarstv. Izdat. Tehn.-Teor. Lit., Moscow, 1955. 804 pp. 26.35 rubles.

This is an exhaustive treatise on unsteady motion of a compressible gas with particular application to the theory of explosions and to internal ballistics. Much material is assembled which has previously been widely scattered in research publications and, in translated form, would be of great value to workers in the explosives field, since, at present, there is no equivalent book written in English.

The first two chapters deal with thermodynamical concepts and the fundamental equations of motion, including an account of the method of characteristics. Chapter III is concerned with self similar motions of media and contains much new material due to Sedov and his group. Chapter IV describes special solutions for isentropic flow corresponding to $\gamma=3$ and other simple gas laws. Chapter V treats one dimensional isentropic motion, especially problems of interaction of rarefaction waves. The three following chapters deal very thoroughly with the properties of shock waves and detonation waves. Chapter IX gives a general account of the propagation of shock waves in unsteady flow. Chapter X is concerned

Stanyukovič, K. P.

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with the motion of detonation and blast waves with cylindrical or spherical symmetry; special attention is given to solutions based on similarity hypotheses. Chapter XI concerns unsteady motion in dense media with emphasis on cavitation phenomena; a section on river waves is also included. Chapter XII contains a complete discussion of Lagrange's Ballistic Problem. The remaining chapters deal with effects of gravity and relativity in gas dynamics and are clearly intended for application to astrophysical problems.

The book sets out a large number of papers, some nearly 20 years old, which have evidently been classified previously. It is extremely long, partly due to the inclusion of too much detail in mathematical development, and partly due to repetition of results. However the style is very clear and, since most leading problems of current interest in unsteady gas dynamics are discussed at length, the book can be recommended as a useful work of reference.

M. Holt (Providence, R.I.).

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MT

SOV/124-57-5-5264

Translation from: Referativnyy zhurnal. Mekhanika, 1957, Nr 5, p 22 (USSR)

AUTHORS: Baum. F. A., Vsekhsvyats'kiy, S. K., Stanyukovich, K. P.

TITLE: On the Explosive Processes of Powerful Volcanic Eruptions (O vzryvnykh protsessakh pri moshchnykh vulkanicheskikh izverzheniyakh) in Ukrainian

PERIODICAL: Nauk. zap. Kiyvs'k. un-t, 1955, Vol 13, Nr 7, pp 123-130

ABSTRACT: The paper analyzes the question of the sources of energy of the gigantic explosive processes observed on numerous occasions during extremely powerful volcanic eruptions (Vesuvius, Fujiyama, "Sangay","Papandayang", Osamayama, Tamboro, "Gunung-Gelungung", "Kazegvina", Krakatau). It is shown that under conditions which exist at extreme depths of the earth there are accumulated tremendous quantities of H_2, CO, CH_4, etc. At elevated pressures and temperatures these are explosive mixtures high in energy and readily detonated. Various reactions are analyzed and an evaluation of the energy released is made. The total amount of the energy of the explosion is calculated which is required to eject solid rocks of several scores of cubic kilometers in size (Krakatau, August 27,

Card 1/2

SOV/124-57-5-5264

On the Explosive Processes of Powerful Volcanic Eruptions

1883). It is also shown that the velocities attained by some individual rocks may exceed 8 km/sec.

From the résumé

Card 2/2

STANYUKOVICH, K.P.

Determining meteor trajectories in the earth's atmosphere. (MLRA 8:6)
BiulVAGO no.16:7-14 '55.

1. Moskovskoye otdeleniye VAGO.
(Meteors)

Trans. 56369

STANYUKOVICH, K.P.

Principles of relativistic gas dynamics in magnetic fields. Izv.AN SSSR Ser.fiz.19 no.6:639-650 N-D '55. (MLRA 9:4)

1.Moskovskoye vysshoye tekhnicheskoye uchilishche imeni N.E.Baumana.
(Cosmic rays)(Nuclear physics)

STANYUKOVICH, K.P., doktor fiziko-matematicheskikh nauk, professor.

A few problems in the elementary theory of gas mixing. [Trudy] MVTU no.32:5-25 '55. (MLRA 9:8)
(Gas flow) (Diffusion) (Jet propulsion)

STANYUKOVICH, K.P., doktor fiziko-matematicheskikh nauk, professor.

Calculating the thrust of various jet propulsion engines. [Trudy] MVTU no.32:26-46 '55. (MLRA 9:8)
(Jet propulsion) (Airplanes--Jet propulsion)

STANYUKOVICH, K.P., doktor fiziko-matematicheskikh nauk, professor.

Problems in the theory of pulse air-jet engines. [Trudy] MVTU no.32: 143-156 '55. (MLRA 9:8)
(Jet propulsion) (Airplanes--Jet propulsion)

STANYUKOVICH, K. P.

USSR/ Physics

Card 1/1 Pub. 22 - 19/46

Authors : Stanyukovich, K. P.

Title : Some results in the domain of relativistic magneto-aerodynamics (gas)

Periodical : Dok. AN SSSR 103/1, 73-76, Jul 1, 1955

Abstract : A mathematical analysis of the aerodynamic expressions for gas movement and the energy conservation in a magnetic field of relativistic domain (4-dimensional space). Cases of one-dimensional movement are considered. Four USSR references (1947-1954).

Institution : The Higher Technical School imeni Bauman

Presented by: Academician N. N. Bogolyubov, February 16, 1955

STANYUKOVICH, K. P.

"Rockets for Interplanetary Travel," a chapter from the book Problems in the Utilization of Atomic Energy, the second revised edition of a collection of articles, published in 1956, Moscow, USSR

ZIGEL', Feliks Yur'yevich; STANYUKOVICH, K.P., nauchnyy redaktor; GOLUBKOVA, V.A., redaktor; YUSFINA, N.L., tekhnicheskiy redaktor

[Can stones fall from the sky?] Mogut li s neba padat' kamni? Moskva, Goskul'tprosvetizdat, 1956. 10 p. and 6 illus.l. (MLRA 10:2)
(Meteorites)

STANYUKOVICH, Kirill Petrovich, doktor tekhnicheskikh nauk; METANIYEVA, M., redaktor; MIKHAYLOVSKAYA, N., tekhnicheskiy redaktor

[Cosmic flights] O kosmicheskikh poletakh. [Moskva] Izd-vo TSK VLKSM "Molodaia gvardiia," 1956. 30 p. (MLRA 9:11)
(Interplanetary voyages)

STANYUKOVICH, K.P.

System of air shock waves during the fall and explosion of meteorites. (MLRA 10:1)
Meteoritika no.14:62-69 '56.
(Meteorites) (Shock waves)

STANYUKOVICH, K.

Interplanetary flights. p.20.
ZA RODINATA, Sofyia, Vol. 5, no. 12, Dec. 1956.

SO: Monthly List of East European Accessions, (EEAL), LC, Vol. 5, No. 6 June 1956, Uncl.

SOV/124-57-7-7596

Translation from: Referativnyy zhurnal. Mekhanika, 1957, Nr 7, p 18 (USSR)

AUTHOR: Stanyukovich, K. P.

TITLE: Some Laws Governing the Motion of a Gas Within Its Own Gravitational Field (Nekotoryye zakonomernosti dvizheniya gaza v sobstvennom pole tyazhesti)

PERIODICAL: V. sb.: Mekhanika (MVTU, Vol 50). Moscow, Oborongiz, 1956, pp 101-119

ABSTRACT: The first part ("The Motion of Highly Rarified Gases") is dedicated to the study of the motion of a particulate or gaseous medium in a highly rarified state wherein the fundamental equations of gasdynamics may be employed, taking into consideration the gravitational fields of the particles and assuming that the pressure of the medium is zero. Totally disregarding the pressure, the author solves the one-dimensional problem of the focusing of the particulate (or cold gaseous) cloud under the action of its own gravitational force. The one-dimensional motion of a cylindrically symmetrical twisted mass of gas is studied. The pressures are disregarded and the gravitational force is taken as

SOV/124-57-7-7596

Some Laws Governing the Motion of a Gas Within Its Own Gravitational Field

speeds greater than the parabolical and may escape from the star. For a prescribed density distribution of the scattering gas, the portion of mass that escapes to infinity is determined. In the last part, the process of the propagation of the shock wave within the rotating gaseous mass is qualitatively discussed. The author tentatively suggests that the process of the compression of a gaseous cloud and the eruption of rotating gass masses under consideration could explain the formation of the solar system. The work contains typographical errors.

M. L. Lidov

Card 3/3

AVAILABLE: Library of Congress

BK/lsb
27 May 1958

Card 10/10

56-6-15/47

STANYUKOVICH, K. P.

AUTHORS: Colitsyn, G. S., Stanyukovich, K. P.

TITLE: Some Problems Concerning Magneto-Gas-Dynamics in Consideration of Finite Conductivity (Nekotoryye voprosy magnitogazodinamiki s uchetom konechnoy provodimosti)

PERIODICAL: Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, 1957, Vol. 33, Nr 6, pp. 1417 - 1427 (USSR)

ABSTRACT: The above subject is dealt with by the following 5 chapters:
1.) The equations used
2.) The general properties of the systems of equations
3.) Steady motion
4.) Slight disturbances
5.) Other methods for the investigation of slight disturbances.

It is shown that the system of equations of magnet-gas-dynamics, by taking account of finite conductivity, is a parabolic system. If an approximated solution is introduced, which, of course, belongs already to the hyperbolic type, the characteristica herefore are derived.
It is shown that the equation of a steady homogeneous current processes a certain critical point, at which the current velocity of

Card 1/2

PA - 2232

AUTHOR: STANYUKOVICH,K.P.

TITLE: Some Unsteady two- and three-dimensional Gas Flows. (Nekotoryye neustanovivshiye ploskiye i prostranstvennyye techenyya gaza, Russian).

PERIODICAL: Doklady Akademii Nauk SSSR, 1957, Vol 112, Nr 4, pp 595 - 598, (U.S.S.R.)

Received: 4 / 1957 Reviewed: 4 / 1957

ABSTRACT: The present work investigates some types of isentropic gas flows of the above-mentioned kind. At first the system of equations for plane gas flows is written down. Potential flows with $u = \partial\varphi/\partial x$, $v = \partial\varphi/\partial y$ are examined, and the following BERNOULLI equation is obtained: $(\partial\varphi/\partial t) + (q^2/2) + i = 0$, where $q = \sqrt{u^2 + v^2}$ and $i = \int dp/\rho = \int c^2 d \ln\rho$ applies. Thus $\rho = \rho(\varphi)$ is easily determined. A class of automodel-like motions is examined by putting $x/t = \xi$, and $y/t = \eta$. Flows of this kind are to be found in different problems connected with the outflow of a gas or the flow round some planes. The above mentioned system of equations is here specialized for this case. The BERNOULLI equation is several times transformed, on which occasion, among others, the independent and the dependent variables are interchanged. In this way a quasilinear equation of second order with respect

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PA - 2232

Some Unsteady two- and three-dimensional Gas Flows.

another special case the generalized solution by PRANDTL-MAIER for the flow round any profile or angle is obtained by a steady gas flow. The here discussed solutions are suitable, among other things, for the study of the flying apart of detonation products in the case of detonations of figure charges.

ASSOCIATION: Not given
PRESENTED BY: Member of the Academy BOGOLJUBOV,N.N.
SUBMITTED: 5.9.1956
AVAILABLE: Library of Congress

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GOLDOVSKIY, Yevsey Mikhaylovich, zasluzhennyy deyatel' nauki i tekhniki, doktor tekhn.nauk, prof.; STANYUKOVICH, Kirill Petrovich, doktor tekhn.nauk, prof.; LYAPUNOV, Boris Valerianovich, inzh.; DOSTUPOV, Boris Grigor'yevich, kand.tekhn.nauk; MAGAZANNIK, D.N., red.; LANINA, L.I., red.; BERLOV, A.P., tekhn.red.

[News of science and technology; from the materials of Sunday lectures delivered at the Polytechnical Museum] Novosti nauki i tekhniki; po materialam voskresnykh chtenii Politekhnicheskogo muzeia. Moskva, Izd-vo "Znanie," 1958. 53 p. (Vsesoiuznoe obshchestvo po rasprostraneniiu politicheskikh i nauchnykh znanii. Ser.4, nos.32/33) (MIRA 11:12)
(Motion pictures, Three-dimensional) (Calculating machines)
(Interplanetary voyages)

STANYUKOVICH, K.P.

10(2); 28(1); 29(1) PHASE I BOOK EXPLOITATION SOV/1603

Moscow. Vyssheye tekhnicheskoye uchilishche imeni Baumana

Nekotoryye voprosy mekhaniki; sbornik statey (Some Problems in Mechanics; Collection of Articles) Moscow, Oborongiz, 1958. 197 p. (Series: Its [Trudy] vyp. 88) Number of copies printed not given.

Ed. (Title page): V.I. Feodos'yev, Doctor of Technical Sciences, Professor; Ed. (Inside book): A.S. Ginevskiy, Candidate of Technical Sciences; Ed. of Publishing House: L. Ye Serebrennik; Tech. Ed.: L.A. Garnukhina; Managing Ed.: A.S. Zaymovskaya, Engineer.

PURPOSE: This collection is intended for scientific workers, Aspirants and students of advanced courses who are interested in problems of aero- and gas dynamics and in the theory of directional control of aircraft.

COVERAGE: The collection contains reports on various problems in applied mechanics. A large portion of the articles is

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SOV/1603

Some Problems in Mechanics (Cont.)

devoted to aerodynamic and gas dynamic investigations. In the first article of the collection, the author, Professor K.P. Stanyukovich, considers the laws of motion of a gas-droplet medium— in particular, the laws of motion of a mechanical mixture of a liquid and a gas with liberation of energy. His conclusions are applicable to the investigation of the motion of a burning fluid jet. The two reports by N.F. Krasnov deal with the aerodynamics of bodies of revolution. In the first, he develops briefly the method of characteristics as applied to the calculation of nonsymmetrical flow about bodies of revolution. In his second report, which treats the base drag of bodies of revolution moving at both subsonic and supersonic speeds, he presents an approximate formula derived for the calculation of the base-drag coefficient in the case of turbulent flow about a body at supersonic speed. V. F. Mikhaylina presents in her report the approximate formulas she obtained for determining the distance between an isolated compression shock and the vertex of a blunt-nosed body of arbitrary form in supersonic flow, and also for determining the velocity and pressure near the critical point. Professor Panichkin presents in his report the partial and general solutions of the differential equation used in the investigation

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Some Problems in Mechanics (Cont.)

Miroslavlev investigates the motion characteristics of one of the automatic control systems used, especially in aircraft and in ship's steering gears. 3

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Some Problems in Mechanics (Cont.)

Some Problems in Mechanics (Cont.)

29(1) PHASE I BOOK EXPLOITATION SOV/1235

Baum, Fillipp Abramovich, Kaplan, Samuil Aronovich, Stanyukovich, Kirill Petrovich

Vvedeniye v kosmicheskuyu gazodinamiku (Introduction to Space Gas Dynamics) Moscow, Fizmatgiz, 1958. 424 p. 4,000 copies printed.

Ed.: Fridman, V.Ya.; Tech. Ed.: Gavrilov, S.S.

PURPOSE: The purpose of this book is to present to astronomers and physicists the most advanced methods of gas dynamics, to be used for solving various astrophysical and physical problems.

COVERAGE: The book is divided into three parts, each of which is essentially complete within itself. The first part presents the fundamentals of gas dynamics as applied to the motions of cosmic gaseous masses in the absence of magnetic fields. Included in this part are the theory of shock waves and the theory of unsteady motions of a gas, the main emphasis being on the motions of a gas in a gravitational field. The applications of theoretical methods to nonstationary stars and to various geophysical problems are given.

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Introduction to Space (Cont.)

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STANYUKOVICH, K.P.

PHASE I BOOK EXPLOITATION SOV/5494

Vasil'yev, Mikhail Vasil'yevich, and Sergey Zakharovich Gushchev

Reportazh iz XXI veka; my zapisali rasskazy dvadtsati devyati sovetskikh uchenykh o nauke i tekhnike budushchego (Reports From the Twenty-First Century; Stories of Twenty-Nine Soviet Scientists on Science and Engineering of the Future) [Moscow] Izd-vo Sovetskaya Rossiya, 1958. 243 p. 50,000 copies printed.

Ed.: V. A. Golubkova; Tech. Ed.: G. I. Kleyeva.

PURPOSE : This book is intended for the general reader.

COVERAGE: The book contains 27 articles (told reporters by Soviet scientists) dealing with probable future progress in physics, chemistry, electricity, metallurgy, engineering, mining, medicine, biology, agriculture, zoology, transportation, exploration of space, and photography. Attention is given to automation, automatic underground gasification of coal, use of new metals, modernization of oil fields, atomic electric stations, production of metal parts by the process of explosion, explosions

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Reports From the Twenty-First (Cont.) SOV/5494

in dam construction, cancer, internal longevity reserves, machine diagnoses of illnesses, surgery vs. treatment by ultrasonic vibrations, mechanical heart substitutes, human body banks, "medical engineering," enriched fodder, "superfertilizers", artificial snowfalls, agriculture vs. "mariculture", radiochemistry, power beam vs. wire, machines doing intellectual work, "HF automobiles" (with "radio motors"), "artificial sun" (electromagnetic rays focused above a city which cause heated molecules to shine), future ocean ships, "railway dreadnoughts", Moscow of the future, moving pavements, wheelless and driverless automobiles, electric cameras, the industrialization of Siberia, use of underground heat, climate control, living on the moon, antimatter, and photon jet. Names of the interviewed scientists are given. There are no references.

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Reports From the Twenty-First (Cont.) SOV/5494

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SOV/139-58-6-3/29

AUTHORS: Orlenko, L.P. and Stanyukovich, K.P.

TITLE: Shock Waves in Solids (Udarnyye volny v tverdykh telakh)

PERIODICAL: Izvestiya Vysshikh Uchebnykh Zavedeniy, Fizika, 1958, Nr 6, pp 14-24 (USSR)

ABSTRACT: A theory is presented of the propagation of shock waves in solids; a relation between instantaneous pressure and deformation is deduced and the corresponding wave and particle velocities computed. The basic equation of propagation in one dimension is

$$\frac{\partial u}{\partial t} + \frac{\partial p}{\partial h} = 0, \quad \frac{\partial u}{\partial h} = \frac{\partial v}{\partial t} . \qquad (1)$$

Here u denotes the particle velocity, v = specific volume ($v = 1/\rho$, where ρ = density) and h the Lagrangian co-ordinate; t and p denote time and pressure respectively. Writing σ for tension and ε for volume strain (i.e. change in volume per unit initial volume) the following relations are obtained:

$$\sigma = -p, \quad \varepsilon = \frac{v - v_0}{v_0} = \frac{\rho_0}{\rho} - 1, \qquad (2)$$

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Shock Waves in Solids

Here v_0 signifies the initial value of v, while ρ and ρ_0 signify the densities associated with v and v_0 by $v = 1/\rho$ and $v_0 = 1/\rho_0$ respectively. Substitution of Eq (2) into Eq (1) yields the following relations

$$\frac{\partial u}{\partial t} = \frac{\partial \sigma}{\partial h} = \frac{d\sigma}{d\varepsilon}\frac{\partial \varepsilon}{\partial h}, \qquad \frac{\partial u}{\partial h} = v_0 \frac{\partial \varepsilon}{\partial t} \quad (3)$$

If the relation between σ and ε is known in functional form, these last equations enable the shock-wave velocity to be deduced. A relation which gives good agreement with experiment is:

$$\sigma - \sigma_0 = -A(\varepsilon - \varepsilon_0)^{-3} \quad (4)$$

where σ_0, ε_0 are initial values of σ, ε and A is related to the elastic properties of the medium. The shock-wave velocity c, associated with this relationship between σ and ε, is readily shown to be given by:

$$c = \sqrt{\frac{dp}{d\rho}} = (\varepsilon + 1)\sqrt{\frac{d\sigma}{\rho_0 d\varepsilon}} = \frac{\sqrt{3A\rho_0}}{\rho\left[\frac{\rho_0}{\rho} - (1 + \varepsilon_0)\right]^2} \quad (6)$$

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Shock Waves in Solids

and the corresponding particle velocity w is given by:

$$w = \sqrt{\frac{3A}{\rho_0}} \frac{1}{\left[\frac{\rho_0}{\rho} - (1 + \varepsilon_0)\right]^2} \qquad (7)$$

The theory is used to discuss the case in which the initial disturbance lies outside the medium, the example chosen being that of an explosive charge detonated at a height ℓ above a plane boundary of the medium. The pressure, p, at any time t after the explosion in this case follows a power law given by

$$\frac{p - p_0}{p_H - p_0} = \left(\frac{\tau}{t + \tau}\right)^{3n} \qquad (29)$$

Here p_H is the value of p at h = 0 and t = 0 respectively; p_0 and n are empirical constants and τ is a characteristic time ℓ/D, where D is the detonation velocity [no numerical results are given in connection with this example but it would presumably be applicable

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Shock Waves in Solids

to a "nuclear device" detonated above the earth's surface]. The theory is then applied to a plate of thickness d and waves reflected from the rear surface of the plate are discussed. There is 1 figure and 1 Soviet reference.

ASSOCIATION: Moskovskoye Vysshaye Tekhnicheskoye Uchilishche imeni Baumana (Moscow Higher Technical School imeni Bauman)

SUBMITTED: 16th April 1958

Card 4/4

VASIL'YEV, M.; GUSHCHEV, S.; NESMEYANOV, A.N., akademik; SHCHERBAKOV, D.I., akademik; ENGEL'GARDT, V.A., akademik; ZHEREBAK, A.R., prof.; LEBEDEV, S.A., akademik; ZENKEVICH, L.A.; GRADOV, A.S.; GOLODOVSKIY, M.G., prof.; STANYUKOVICH, K.P., prof.

Ahead with the dream! Znan.sila 33 no.12:24-25 D '58. (MIRA 11:12)

1. Chlen-korrespondent AN SSSR (for Zendevich). 2. Direktor Nauchno-issledovatel'skogo instituta proyektirovaniya obshchestvennykh zdaniy i sooruzheniy (for Gradov). (Science)