88054

S/139/60/000/006/021/032
E193/E483

X-Ray Investigation of Elastic Deformation of Mono- and Poly-Crystals

analysis of polycrystalline wire specimens of steel 3, conducted with the aid of an X-ray camera, specially adapted for examination of stressed specimens. In this case, too, the intensity of the (110) and (211) lines and the width of the (211) lines remained constant until the externally applied tensile stress exceeded the elastic limit (30 kg/mm^2) of the alloy studied. There are 8 figures and 16 references: 4 Soviet and 12 non-Soviet (3 of which are translated into Russian).

ASSOCIATION: Sibirskiy metallurgicheskiy institut
(Siberian Metallurgical Institute)

SUBMITTED: July 6, 1959

Card 3/4

88054
S/139/60/000/006/021/032
E193/E483

X-Ray Investigation of Elastic Deformation of Mono- and Poly-Crystals

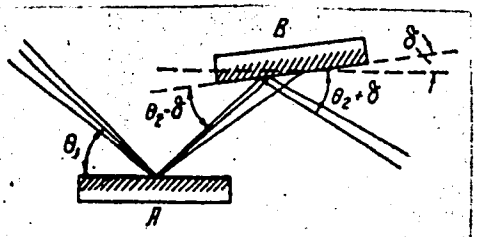


Рис. 1. Схема двукристального спектрометра.

Fig.1.

Card 4/4

S/070/60/005/006/004/009
E021/E306

AUTHORS: Finkel', V.M. and Berezovskiy, V.N.

TITLE: Study of the Shape and Size of X-ray Interference Spots of Elastically-deformed Transformer Steel

PERIODICAL: Kristallografiya, 1960, Vol. 5, No. 6, pp. 896 - 903 + 1 plate

TEXT: The reflections of X-rays from loaded and unloaded polycrystalline samples of transformer iron have been studied using an X-ray camera with an equivalent convergence of the X-ray beam of 9-15°. 40 specimens were studied and reversible changes in the interference spots occurred only in 10 of them. The relative quantity of spots changing in a reversible manner was very small - 1-5% in the majority of cases and never greater than 12%. Thus it can be assumed that reversible changes in grains in the process of elastic extension is a rare phenomenon. There were three main types of elastic changes in the grains of the polycrystal: a decrease in perfection of the crystallites; an increase in

Card 1/3

S/070/60/005/006/004/009
E021/E306

Study of the Shape and Size of X-ray Interference Spots of Elastically-deformed Transformer Steel

perfection of the crystallites, and intensive rotation of several crystallites. A decrease in perfection was shown by an increase in size of the spots in the direction of the acting stresses and also in a tangential direction. An increase in perfection was shown by a decrease in size of the spots, a decrease in their intensity and the disappearance of individual spots. Rotation of crystallites was shown by the interrelated displacement and rotation of spots and also from changes in the ratio of intensity of the components of the K_{α}-doublet. It was established that, as a rule, during elastic deformation, the reflections from the most imperfect crystallites change. This was as a result of considerable local stress gradients in, and in the neighbourhood of, the grain boundaries. The microstresses

Card 2/3

S/070/60/005/006/004/009
E021/E306

Study of the Shape and Size of X-ray Interference Spots of Elastically-deformed Transformer Steel

involved could be quite high and could result in the creation of a microcrack. Acknowledgment is made to Professor Yu.V. Grdina, in whose laboratory the work was executed.
There are 9 figures, 1 table and 18 references: 14 Soviet and 4 non-Soviet.

ASSOCIATION: Sibirskiy metallurgicheskiy institut imeni S. Ordzhonikidze (Siberian Metallurgical Institute imeni S. Ordzhonikidze)

SUBMITTED: October 9, 1959

Card 3/3

FINKEL', V.M., BELORUKOV, V.F.

Classification and occurrence of residual stresses.
Zav.lab. 26 no.7:859-860 '60. (MIRA 13:7)

1. Sibirskiy metallurgicheskiy institut im. S. Ordzhonikidze.
(Deformations (Mechanics)) (Strains and stresses)

S/126/61/011/004/015/023
E193/E483

AUTHORS: Finkel', V.M. and Krotenok, P.I.

TITLE: On the Problem of Plastic Deformation in the Brittle Fracture Plane

PERIODICAL: Fizika metallov i metallovedeniye, 1961, Vol.11, No.4, pp.601-608

TEXT: The fact that, even in the case of brittle fracture of metal, plastic deformation may take place in the thin layer, adjacent to the fracture plane, has already been established by many authors (Ref.7 to 18). Depending on the nature of the applied load and on temperature, the degree of plastic deformation has been found to vary between 1 and 5%, the thickness of the deformed layer varying from 20 microns to 3 mm. The object of the present investigation was to study the lattice distortion and fragmentation near the brittle fracture plane of rail steel, containing 0.75% C. This was done with the aid of X-ray diffraction analysis of the fracture surfaces of impact test pieces tested to fracture at temperatures between +100 and -70°C, the investigated region being situated 3 mm below the notch. The problem of determining the size of the mosaic blocks and the magnitude of the distortions of

the second type was, in this case, complicated by the fact that the thickness of the plastically (and non-uniformly) deformed layer was of the same order of magnitude as the depth of penetration of the X-ray beam. This difficulty was overcome by using a technique, consisting in analysis of X-ray patterns obtained at various angles of incidence. The theoretical basis for this technique is illustrated in Fig.1, where the thickness (Z, microns) of the material participating in producing the X-ray pattern is plotted against the angle of incidence α, the diagram having been constructed for the CoK_α radiation; curves 1 to 5 relate, respectively, to the (110), (200), (211), (220) and (310) lines in the upper half of the film; curves 1' to 5' relating to the same lines in the lower half of the film. In the present work, the authors utilized the (310) and (211) lines, produced on the opposite halves of the film by an X-ray beam falling on the target at $\alpha = 59°$ which corresponded to $Z = 35\,\mu$. The dimensions of the mosaic blocks and the magnitude of the distortions of the second type were determined by the method described by W.A.Rachinger (Ref.22). The variation of the degree of plastic

deformation with the distance from the fracture plane was studied by analysis of the (211) lines obtained for the angles of incidence of 50, 60, 70, 80, 90 and 95° and the (310) lines obtained for α = 119, 122, 128, 138, 149 and 156°, where a region situated at a distance of 7 to 37 microns from the surface was covered. In order correctly to interpret the X-ray data, it was necessary to determine the dependence of the width of the X-ray lines on the angle of incidence. After a chapter concerned with this problem, the authors report their findings which can be summarized as follows: 1. The impact strength of the rail steel studied decreases monotonically with decreasing temperature, falling from approx 10 kgm/cm^2 at 100°C to approx. 3 kgm/cm^2 at -70°C. 2. The effect of temperature on the plastic deformation of a surface layer 35 microns thick is illustrated in Fig.5, where the dimensions (D, Å) of the mosaic blocks (lower diagram) and micro-stresses ($\Delta a/a \cdot 10^{-4}$) (upper diagram) are plotted against the test temperature (°C). 3. The variation of the degree of plastic deformation with the distance from the fracture plane is illustrated in Fig.6, where the size of the mosaic blocks (D, Å) is plotted against the thickness (Z, microns) of the layer analysed,

the six curves relating to various test temperatures, as indicated on each diagram. It will be seen that at temperatures between 85 and -13°C, the size of the mosaic blocks remains constant for Z = 10 to 40 μ which indicates fairly uniform distribution of plastic deformation; the shape of the impact test pieces, broken at these temperatures, is markedly changed near the fracture plane, and the plastically deformed region extends to a distance of several mm from the fracture plane. At lower temperatures, the size of the mosaic blocks increases with the distance from the fracture plane; this indicates that with decreasing temperature, the degree of localization of plastic deformation increases, the thickness of the plastically deformed layer not exceeding 35 to 40 microns; this is also confirmed by the fact that the external dimensions of test pieces, broken at low temperatures, remain unchanged. 4. The interesting fact that no distortions of the second type have been found in test pieces, broken at low temperatures, is attributed to the possibility of plastic deformation being, in this case, localized not only in the 35 to 40 microns thick layer but also in micro-volumes of the size comparable with the size of the mosaic blocks. Acknowledgments

On the Problem of Plastic ...

are made to Professor Ya.V.Grdina for his assistance. There are 6 figures and 28 references: 22 Soviet and 6 non-Soviet.

ASSOCIATION: Sibirskiy metallurgicheskiy institut
(Siberian Metallurgical Institute)

SUBMITTED: August 10, 1960

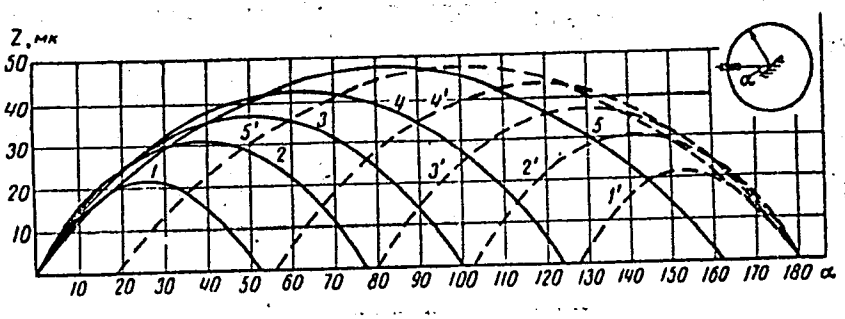


Fig.1.

Card 5/6

S/126/61/012/005/015/028
E091/E335

AUTHORS: Finkel', V.M. and Kutkin, I.O.

TITLE: Investigation of crack propagation in steel

PERIODICAL: Fizika metallov i metallovedeniye, v. 12, no. 5, 1961, 732 - 739

TEXT: The method and results of a study of crack propagation in metals under impact loading is reported. High-speed cine-photography was used, in which exposures of up to 4800 frames/sec could be achieved. Incisions were made along metallic plates, 250 x 100 x 7 mm, which enabled even ductile metals such as low carbon steel to be tested for impact resistance. Each specimen was placed, incision upwards, on a T-shaped rest. The latter was placed on a massive support. A striker was positioned at the end of the plate. The load falling from various heights delivered an impact to the striker and a crack propagated itself along the incision of the plate. Weights of between 16 and 90 kg were used and the height was varied from 0.5 - 4 m. The cine-camera was placed horizontally and exposures were made through a mirror inclined at an angle of 45°. The specimen was illuminated

Card 1/3

Investigation of ....

in the incision by two powerful illuminators, one of which gave out a coloured beam across a recess in the striker. The instant of impact was registered on the film when the falling load made contact with the striker, by flashing an impulse bulb, which made a dark background on the frame. Destruction was spread over 2 - 64 frames, depending on the speed of the latter and the conditions of mechanical testing. Specimens of the steel 35ХГ2 (35KhG2) with round incisions were studied. The following factors were considered: 1) influence of the weight of the load; 2) influence of preliminary deformation and 3) influence of temperature on the kinetics of the process of destruction. It was found that the rate of crack propagation varied greatly, reaching 1 500 m/sec. Crack-propagation was intermittent, with stops in between. Destruction is preceded by temporary retardation during which plastic deformation of the specimen takes place. The students I. Voronov, V. Gurariy and A. Savel'yeva participated in the work. Acknowledgments are expressed to Professor Yu.V. Grdine for his interest in the work.

Card 2/3

Investigation of ....

There are 5 figures, 1 table and 23 references: 12 Soviet-bloc (one a Russian translation of a non-Soviet publication) and 11 non-Soviet-bloc. The four latest English-language references mentioned are: Ref. 2: D.G. Christie - Trans. Soc. Glass Techn., 1952, 36; Ref. 3: H.E. Edgerston, F.E. Barstow - Amer.Ceram. Soc., 1941, 24, no. 7, 131; Ref. 8: A.M. Breche, C.J. White - J. Appl. Phys., 1959, 27, no. 9, 980; Ref. 9: T. Sakurai -JIndustr. Explos.Soc., Japan, 1958, 19, no. 3, 181.

ASSOCIATION: Sibirskiy metallurgicheskiy institut
(Siberian Metallurgical Institute)

SUBMITTED: January 9, 1961

✓

Card 3/3

3439

S/139/62/000/001/030/032
E073/E535

15.2120

AUTHORS: Finkel', V.M. and Kutkin, I. A.

TITLE: Study of the kinetics of the growth of cracks in glass

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Fizika, no.1, 1962, 173-174

TEXT: A number of authors have found that the speed of increase of a brittle crack may reach 0.6times the speed of transverse waves. In this paper the results are given of investigations of the process of brittle fracture taking place at relatively low speeds. The results were obtained on 18 x 24 mm plates of photographic glass, in the centre of which a 30 to 50 mm crack was produced artificially. The process was photographed by means of a high-speed cine-camera at a rate of 3500-4800 frames/sec. Depending on the type of impact applied, the propagating crack could be seen on 7 to 600 frames. Three series of tests were made, in one the speed of fall of the load remained constant at 0.9 m/sec and the load was varied, in the second the kinetic energy of the falling loads was maintained

Card 1/3

constant, in the third the quantity of motion remained constant. In the first series the most characteristic feature was the propagation of the crack at the minimum stress of 0.3 kg/mm^2; it was nonuniform and jump-like and varied between 0 and 250 m/sec. The highest recorded speed, at 10 kg/mm^2, exceeded 300 m/sec, which is five to six times slower than speed values published by other authors. Of great interest is the fact that whilst in thin glass the speed of crack propagation was small, in thick (5 to 8 mm) glass, the crack propagation was much faster (reaching 800 to 1000 m/sec). The second and third series of tests confirmed relations revealed in the first series of tests. During these, the highest recorded speeds of crack propagation were 240, 270 and 300 m/sec, respectively. Of great interest is the ability of the cracks to stop growing for a long time and then suddenly to grow again. Usually, if the loads are large enough, the crack propagation stopped for durations of the order of 0.2 to 0.4 x 10^{-3} sec, whilst short duration stoppages in crack propagation can be attributed also to factors other than nonuniformity of the material (for instance,

interference of elastic waves), long duration stoppages can be attributed exclusively to nonuniformities in the glass.

ASSOCIATION: Sibirskiy metallurgicheskiy institut imeni S. Ordzhonikidze
(Siberian Metallurgical Institute imeni S. Ordzhonikidze)

SUBMITTED: October 19, 1960 (initially)
May 16, 1961 (after revision)

Card 3/3

S/148/62/000/002/006/008
E039/E435

18.8200

AUTHOR: Finkel', V.M.

TITLE: On the question of dynamic fracture

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Chernaya metallurgiya, no.2, 1962, 111-117

TEXT: The static examination of cracks has been studied in a number of papers, neglecting kinetic processes. There are important dynamic processes associated with rapidly developing cracks and in this paper the dynamic aspects of brittle fracture are studied. The autocatalytic nature of brittle fracture is considered first and the characteristics associated with cold brittleness are enumerated. In particular the following: the low speed of initial formation of cracks; the large speed of expansion of cracks at certain stages reaching 2100 m/sec in glass and about 1000 m/sec in metals; the effect of dimensions. As a crack develops the cross-section of material is reduced; hence the strain at the apex of the crack is increased and the following relation exists:

$$\frac{\sigma^2}{E} l^3 \geqslant \alpha l^2$$

Card 1/3

where σ - strain; E - modulus of elasticity; l - length of crack and α - coefficient of surface tension. In addition, the rate of release of elastic energy exceeds the rate of absorption of energy, i.e. $dU/dl > dW/dl$. The initial formation of cracks is considered for the cases of the open crack, the internal crack and multiple internal cracks in polycrystals. In addition, the way in which the development of cracks is associated with the mode of propagation of Rayleigh waves is discussed. It is shown that such waves propagate in the (100) plane of cubic crystals. The relevant equations are derived and calculations based on these equations are carried out for a series of metallic and non-metallic single crystals. It is predicted that the materials which have surfaces along which Rayleigh waves can propagate are brittle. For example, tungsten, NaCl, KBr and KCl which we know to be brittle; while materials in which Rayleigh waves cannot propagate such as Ni, Al, Cu, Pb, Ag, Au, K, V and Li are tough. These considerations are strictly true only for the ideal single crystal. In practice, the following points must be considered: the effect of random orientation of the grains in polycrystals;

S/148/62/000/002/006/008
On the question of dynamic fracture E039/E435

anisotropy of the modulus of elasticity; the influence of plastic deformation. Different types of surface waves are discussed and their propagation along different crystal planes. Finally, the possible form of a chain process in the development of cracks is discussed in detail. There are 2 figures and 1 table.

ASSOCIATION: Sibirskiy metallurgicheskiy institut
(Siberian Metallurgical Institute)

SUBMITTED: May 8, 1961

Card 3/3

38900

S/181/62/004/006/003/051
B108/B104

15,2120

AUTHORS: Finkel', V. M., and Kutkin, I. A.

TITLE: Growth of cracks in glass under dynamic load

PERIODICAL: Fizika tverdogo tela, v. 4, no. 6, 1962, 1412-1418

TEXT: The development of cracks in glass due to impact and explosion was studied. Bending stress was applied to the specimens, after which a charge was detonated in the middle of one of their surfaces. The development of the cracks was high-speed-filmed (4,500-240,000 pictures per second). The maximum speed of crack propagation (up to 3,300 m/sec) rises with the load applied to the specimen but becomes constant when the loading exceeds 1.5 kg/mm^2. The propagation of the cracks is not steady but by sudden jumps. Some degree of reversibility was observed in the cracks under static and dynamic deformation, this being due to the opening and closing of the surface of "leader" cracks. A delay in the rupture of the specimens was detected varying between 0 and $360 \cdot 10^{-5}$ sec and dependent on whether incipient cracks were present or not. There are 5 figures and

Card 1/2

S/181/62/004/006/003/051
B108/B104

Growth of cracks in glass under ...

1 table.

ASSOCIATION: Sibirskiy metallurgicheskiy institut im. S. Ordzhonikidze, Novokuznetsk (Siberian Metallurgical Institute imeni S. Ordzhonikidze, Novokuznetsk)

SUBMITTED: August 8, 1961 (initially)
November 28, 1961 (after revision)

Card 2/2

S/126/62/013/001/010/018
E091/E580

18.1110

AUTHORS: Finkel', V.M. and Kutkin, I.A.

TITLE: Propagation of cracks in carbon steels

PERIODICAL: Fizika metallov i metallovedeniye, v.13, no.1, 1962, 114-121

TEXT: In the authors' previous paper, the growth of cracks during the dynamic bending of steel 35ХГС (35KhGS) was studied by high-speed cinematography. In the present paper, the kinetics of the destruction of a number of carbon steels is discussed. For the quantitative analysis of the plastic deformation associated with crack growth, thin strips of paper were stuck on to normal specimens, parallel to the end face, at intervals of 40 mm, and the angle of bend of each cross-section was measured on the film frames from these marks, using a measuring microscope with an accuracy of 20'. In order to increase the photogeneity of the cracks, the base of the notch was treated with 40% HNO_3. On low carbon steels of low etchability carbon black was applied with a spirit lamp. The steels СТ.3 (ST.3), СТ.25 (ST.25), СТ.35 (ST.35), СТ.50 (ST.50), СТ.65Г (ST.65G) and СТ.У-8А (STU-8A) were tested

Card 1/2

with various notch shapes. For studying crack growth for various stress systems, the notch shape was varied from round to sharp triangular, except for steels St.3 and St.25 which did not fail with round notches, and were, therefore, tested only with triangular ones. The tests were carried out at room temperature, by dropping a load of 25 kg from a height of 2 m. The working section of all specimens, independent of notch shape, was 2.4 - 2.5 mm. It was found that on impact bending of notched plates, plastic deformation is propagated in the form of waves at a speed depending on the degree of deformation from 20 m/sec to 2 km/sec and above. A retardation of plastic deformation of 20 - 160.10^{-5} sec was observed, depending on the type of steel. In all steels investigated, retardation of failure takes place. The latter sometimes attains 380.10^{-5} sec, and decreases with increasing notch sharpness. There are 6 figures and 2 tables.

ASSOCIATION: Sibirskiy metallurgicheskiy institut im.S.Ordzhonikidze (Siberian Metallurgical Institute imeni S. Ordzhonikidze)

SUBMITTED: January 16, 1961 (initially)
March 27, 1961 (after revision)
Card 2/2

S/126/62/013/002/010/019
E021/E480

18.1180

AUTHORS: Finkel', V.M., Zraychenko, V.A., Maslovskaya, Z.A., Bykov, S.B.

TITLE: The mechanism of crack propagation in steel

PERIODICAL: Fizika metallov i metallovedeniye, v.13, no.2, 1962, 263-267

TEXT: The propagation of cracks was investigated on a standard micro-apparatus supplied with a device for deforming the samples. The samples had a double-sided groove of 2.5 to 3 mm depth and 50 to 70° angle. A transformer steel and steel CT3 (St 3) were used. The root of one of the grooves was observed; cracks were produced under conditions of constant loading and the process was recorded on a cine-film. The time to fracture varied within wide limits (seconds to hours) depending on the value of the superimposed stresses and the orientation of the grains in the region of the crack. The speed of the cine-camera was therefore varied from 150 sec per frame to 60 - 70 frames per sec. Results showed that the crack originates from a highly localized plastic deformation zone, extending in the case of the transformer steel to

Card 1/ 2

The mechanism of crack ...

a depth of 1 to 3 grains. Transcrystalline propagation occurs by the projection of a "fan" of slip bands. These join in the deformation zones with subsequent growth of cracks. The possible nucleation of cracks in the regions of defects, not rare in transformer steels, must also be considered. These regions were observed as bends in the groups of slip planes. The plastically deformed zone is the direct source of microcracks. In addition, it activates the formation of fracture nuclei in front of the fracture in regions where slip planes are still not observed. During this process the grain, in which deformation and fracture are taking place, is bordered by extremely fine boundaries. The appearance of boundaries is very marked in the latter phases of separation of the metal. The grains, as it were, are formed into "globules". This is evidence of the part played by grain boundary flow and slip in the process of fracture. There are 4 figures.

ASSOCIATION: Sibirskiy metallurgicheskiy institut
(Siberian Metallurgical Institute)

SUBMITTED: January 11, 1961

Card 2/2

FINKEL', V.M.; BEREZOVSKIY, V.N.

Investigating the substructure of electrical steel in connection with elastic deformation. Fiz. met. i metalloved. 13 no.2: 268-274 F '62. (MIRA 15:3)

1. Sibirskiy metallurgicheskiy institut im. S.Ordzhonikidze.
(Steel--Metallography)
(Deformations (Mechanics))

S/126/62/013/005/010/031
E091/E435

AUTHORS: Finkel', V.M., Savel'yev, A.M.

TITLE: Study of the influence of crack propagation on the structure of fractures in transformer steel

PERIODICAL: Fizika metallov i metallovedeniye, v.13, no.5, 1962, 710-717

TEXT: This paper was presented at the 7th All-Union Scientific-Technological Congress on the Application of X-rays to the investigation of materials (June 19-25, 1961). High speed cine-exposure and X-ray structural analysis were used for studying respectively the rate of crack propagation and the degree of deformation of the fracture surface of coarse-grained transformer steel. Specimens of the following dimensions were cut from transformer steel sheet of 10 mm thickness: 280 x 100 x 10 mm. Notches of triangular and round cross section were cut along the plates. To obtain a coarse grain size (1 to 3 mm) the plates were annealed at 1100°C for 12 hours. Fracturing and taking of cine-exposures of the specimens was

Study of the influence ...

by a method described by V.M.Finkel' and I.O.Kutkin (FMM, v.12, no.5, 1961). The specimen was placed with the notch uppermost on a knife-edge and fractured by a falling ⊓-shaped hammer. The movement of the crack along the base of the notch was filmed at up to 4800 frames/sec. The moment of impact was registered by the flash of a flash bulb. To estimate the deformation along the specimen due to bending, graduation lines were marked on or thin strips of paper glued to the specimen. In order to increase the photogeneity of the crack, the notch surface was dusted with soot. The filming was carried out via a mirror placed at an angle above the specimen. The surfaces of the fractures were investigated by X-ray diffraction at points corresponding to various rates of crack propagation, using a variation of a previously described method by V.M.Finkel' and V.N.Berezovskiy. It was found that plastic deformation in the fracture surface decreases with increasing speed of crack propagation. The kinetics of failure can be affected by plastic deformation preceding or accompanying crack-propagation or plastic deformation of the opened up crack surfaces. Preceding

Study of the influence ...

and accompanying deformation predominate: the first determines the tendency to form cracks, the second determines the propagation characteristics. Accompanying deformation predominates in brittle fracture, preceding deformation in ductile fracture. The locality of accompanying deformation and its degree, compared to that of preceding deformation, must increase with increase in the rate of crack propagation. The third type of deformation, that of the crack surfaces, can take place either due to mechanical bending during opening of the crack, or in connection with the movement along the crack surface of relief impulses. In the latter instance it must increase with increase in crack propagation. There are 4 figures.

ASSOCIATION: Sibirskiy metallurgicheskiy institut
(Siberian Metallurgical Institute)

SUBMITTED: August 1, 1961

Card 3/3

1.

40676

18.8200,

S/126/62/014/002/010/018
E193/E383

AUTHORS: Finkel', V.M. and Kutkin, I.A.

TITLE: Study of the kinetics of fracture of high-carbon steels in tension

PERIODICAL: Fizika metallov i metallovedeniye, v. 14, no. 2, 1962, 259 - 266

TEXT: The object of the present investigation was to establish how fast was the rate of propagation of cracks in steels under a tensile stress. The experimental work was conducted on high-carbon steels ШХ15 (ShKh15) and 65Г (65G), in both the hardened and normalized condition. Tensile loads of up to 72 kg/mm^2 were applied to thin, flat test pieces and the crack was initiated, in each experiment, by detonating the explosive charge attached at the edge and in the centre of the gauge length of the test piece. The detonator was synchronized with an illuminating system and a high-speed cine-camera capable of operating at speeds of 120 000 to 240 000 frames/sec. Typical results obtained on quenched specimens of steel ShKh15 are

Card 1/3

Study of the kinetics of ....

reproduced in Fig. 4, where the length of the crack (L, mm) is plotted against time (t x 10^6 sec), curves 1-5 relating to specimens fractured under the applied stresses of 66, 30, 19.4, 18.7 and 13.2 kg/mm^2. It will be seen that the rate of propagation of cracks increased with increasing magnitude of the applied stress, the maximum value observed being about 3 000 m/sec. It was found, however, that even under these conditions the process of fracture retained its intermittent (steplike) character. Each stage of the propagation of cracks in the quenched steel was preceded by a period during which redistribution of stresses and the concentration at the root of the crack took place. There are 6 figures.

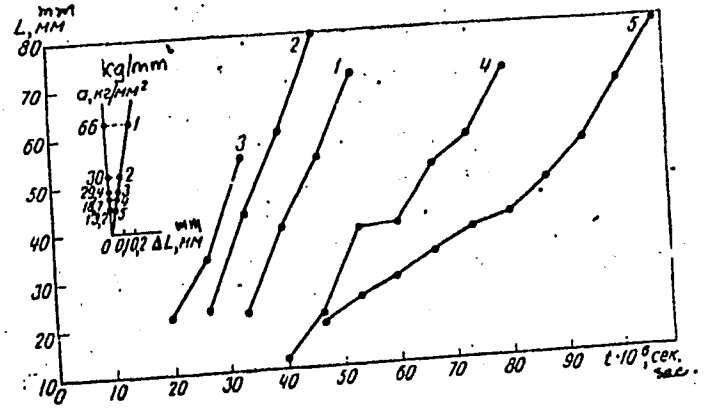
ASSOCIATION: Sibirskiy metallurgicheskiy institut im. S. Ordzhonikidze (Siberian Metallurgical Institute im. S. Ordzhonikidze)

SUBMITTED: September 27, 1961

S/126/62/014/002/010/018
E193/E383

Study of the kinetics of ....

Fig. 4:



Card 3/3

43553

S/126/62/014/005/010/015
E111/E435

18.7200

AUTHORS: Finkel', V.M., Kutkin, I.A.

TITLE: Influence of test temperature and heat treatment on crack growth in certain steels

PERIODICAL: Fizika metallov i metallovedeniye, v.14, no.5, 1962, 775-778

TEXT: The authors' previous work was on loss of strength of various untreated steels notched in various ways when tested at room temperature. They have considered it interesting to study the effect of temperature and heat treatment on fracture kinetics and primarily crack propagation. In one series of experiments they investigated 280 x 100 x 8(10) mm metal specimens with arrested natural cracks and those with artificial cracks. In the second series high-speed photography was used on plexiglass specimens geometrically equivalent to the metal ones. It was found that crack growth on the notch surface reflects closely the movement of a main crack in the core of the specimen. The effect of temperature (+100 to -70°C) was studied on type-50 steel: with falling temperature less deformation is needed for a crack to appear and grow. Unlike the kinetics of the fracture process

Card 1/2

Influence of test ...

itself the ductility characteristics of the metal change regularly with changing temperature. The effect of heat treatment was studied on types ШХ15 (ShKh15), 65Г (65G) and 50 steels. The delay to failure was found to rise considerably with rising tempering temperature (100 to 700°C). The speed of the plastic wave was highest in hardened specimens and decreased with tempering; tempering also affected the kinetics of crack movement: as they flew through the air the fragments of both heat treated and untreated specimens straightened out, performing in the process a complicated series of oscillations. There are 3 figures and 1 table.

ASSOCIATION: Sibirskiy metallurgicheskiy institut
(Siberian Metallurgical Institute)

SUBMITTED: December 27, 1961

Card 2/2

32817
S/020/62/142/001/014/021
B104/B102

15.2610

AUTHORS: Finkel', V. M., and Kutkin, I. A.

TITLE: Destruction of high-strength hard glass

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 142, no. 1, 1962, 75-76

TEXT: The destruction of hard glass by a metal bar shot onto the glass was photographed with a high-speed motion-picture camera (120,000 frames per sec). A set of pulse tubes was the light source. The front of destruction formed by a great number of cracks has a spherical shape around the impact center. The distinct crack ramifications produce porous granulation. The distances between radial cracks vary during their development. In the first stages, these distances are equal to the cell dimensions after destruction. The grains appearing after destruction are formed by tangential cracks developing from the radial cracks. Most of the grains are formed during the development of radial and tangential cracks. A minor part of them is formed at a later stage of destruction. The rate of propagation of the destruction front is constant and amounts to 1700 m/sec. There are 2 figures and 6 references: 3 Soviet and 3 non-

Card 1/2

32817
S/020/62/142/001/014/021
B104/B102

Destruction of high-strength ...

Soviet. The two references to English-language publications read as follows: D. G. Christie, Trans. Soc. Glass Techn., 24, no. 7, 131 (1947); H. E. Edgerston, E. E. Barstow, J. Am. Ceram. Soc., 24, no. 7, 131 (1941).

ASSOCIATION: Sibirskiy metallurgicheskiy institut im. S. Ordzhonikidze (Siberian Metallurgical Institute imeni S. Ordzhonikidze)

PRESENTED: June 17, 1961, by P. A. Rebinder, Academician

SUBMITTED: June 16, 1961

Card 2/2

35062

S/020/62/143/001/017/030
B104/B108

AUTHORS: Finkel', V. M., and Kutkin, I. A.

TITLE: Reversibility of cracks in glass

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 1, 1962, 90-91

TEXT: After cutting optical glass with a diamond, cracks of 20-60 mm length were produced by slight impacts. During static bending of the glass specimens, some of the cracks quickly became longer. After the load was removed, the visible cracks again assumed their original length. Traces of the crack elongation can then no longer be observed. Similar observations are also made during dynamic bending of glass. The cracks do not disappear completely, as they develop again in the same direction under dynamic bending. These effects are explained by a partial recovery of the binding forces between the crack surfaces or by distances between the crack faces which are smaller than 5000 Å. P. A. Rebinder (Yubileynyy sbornik, posvyashchennyy 30-letiyu Velikoy Oktyabr'skoy sotsialisticheskoy revolyutsii, 1, Izd. AN SSSR, 1947, p. 33; Vestn. AN SSSR, 10, no. 8, 9 (1940)) Poniziteli tverdosti v burenii, Izd. AN SSSR, (1944), and I. V. Obreimov

Card 1/2

S/020/62/143/001/017/030
B104/B108

Reversibility of cracks in glass

(Proc. Roy. Soc., 127 (A), 290 (1930)) are mentioned. There are 2 figures and 10 references: 8 Soviet and 2 non-Soviet. The two references to English-language publications read as follows: A. A. Griffith, Phil. Trans Roy. Soc., A 221, 163, 1920; I. V. Obreimov, Proc. Roy. Soc., 127 A, 290 (1930).

ASSOCIATION: Sibirskiy metallurgicheskiy institut im. S. Ordzhonikidze (Siberian Metallurgical Institute imeni S. Ordzhonikidze)

PRESENTED: June 17, 1961, by P. A. Rebinder, Academician

SUBMITTED: May 21, 1961

Card 2/2

ACCESSION NR: AR4034479 S/0058/64/000/003/E046/E046

SOURCE: Ref. zh. Fiz., Abs. 3E353

AUTHOR: Finkel', V. M.; Kutkin, I. A.

TITLE: Propagation of cracks in some single crystals

CITED SOURCE: Dokl. VI Nauchn. konferentsii Novokuznetskogo ped. in-ta po fiz.-matem. naukam. Novokuznetsk, 1963, 124-126

TOPIC TAGS: crystal failure, crack propagation, crack speed, surface fault, microinterferometry, x ray study, high speed cinematography study, surface groove, surface jog, cleavage plane, plastic deformation

TRANSLATION: High speed motion picture, x-ray, and interference methods were used to study the dependence of plastic deformation in the fault surface on the rate of motion of a crack in single crystals

Card 1/2

ACCESSION NR: AR4034479

of NaCl, KCl, KBr, and LiF. The rate of propagation of the crack can vary over a wide range, from 100 to 1400--1500 m/sec. A micro-interferometric investigation of the fault surface has shown the formation of not only large grooves but of a complicated system of jogs, and with increasing velocity the jogs increase in density and become curved. An x-ray investigation using a two-crystal spectrometer shows a decrease in the disorientation and a decrease in the plastic deformation with increasing crack speed. The relief of the damage surface is due, in the author's opinion, to the transition of the crack from one cleavage plane to others at increasing fault rates, or to the presence of surface waves. S. Shil'shteyn.

DATE ACQ: 10Apr64 SUB CODE: PH ENCL: 00

Card 2/2

ACCESSION NR: AR4036260 S/0137/64/000/003/I038/I038

SOURCE: Referativnyy zhurnal. Metallurgiya, Abs. 3I227

AUTHOR: Finkel', V. M.; Kutkin, I. A.

TITLE: Simultaneous growth and branching of many cracks in glass, stalinite, and hardened steel

CITED SOURCE: Dokl. VI Nauchn. konferentsii Novokuznetskogo ped. in-ta po fiz.-matem. naukam. Novokuznetsk, 1963, 127-128

TOPIC TAGS: Glass cracking, stalinite cracking, hardened steel cracking, crack propagation, cracking velocity

TRANSLATION: Photographic glass was crushed by the impact of a falling load via a hammer block; the movement of several cracks arising simultaneously was studied by means of an SKS-1 motion picture camera at film speeds of 4500-4800 m/sec. The time of the failure lag was found to be 300×10^{-5} sec. It is characteristic that the cracks propagated in a discontinuous manner, and the velocity changed from 0 to

Card 1/3

ACCESSION NR: AR4036260

600-700 m/sec; the velocity change for most of the cracks of the bundle occurred simultaneously. When photographic glass previously loaded statically in accordance with the pure-bend mode was crushed by the burst of an electric detonator via a steel rod, the simultaneous generation of many cracks was observed either immediately under the hammer block or at the edge of the glass, as a result of the reflection of the pressure impulse with a changed sign. The filming was done with an SFR-1 camera at a speed of 120,000 frames per sec. The velocities of the cracks were different and could differ by as much as one order of magnitude in adjacent cracks. Nevertheless, consistent changes in velocity were noted for all the cracks. In hardened samples of 85KhV steel subjected to rupture with a tester, the cracks were initiated by an explosion and recorded with the SFR-1 camera at a speed of 240,000 frames per sec. Usually, two cracks emerged from the break zone, one of which outstripped the other. Their velocity varied between 0 and 2600 m/sec. During the first stages of motion of the cracks, there is observed a coordination of the velocities of their propagation which disappears at later stages. A fast propagation of the cracks with velocities of 3000 m/sec is then observed. However, periods of slow growth of the cracks (100-300 m/sec) and sometimes a complete cessation of motion lasting up to 10^{-5} sec are not excluded. The observed synchronous

Card 2/3

ACCESSION NR: AR4036260

velocity change is attributed to the dynamic nature of the loading. The pulsed application of the load creates in the crushed material an elastic wave which propagates throughout the entire volume of the solid and which is capable of affecting many cracks simultaneously to a comparable degree, giving them an additional velocity or slowing them down. In the case of a quasi-stationary process, however, when the velocity of the crack is considerably smaller than that of the elastic waves, the fracture is selective and becomes localized on the most active crack. A study of the kinetics of fracture of stalinite revealed the ability of most of the cracks to branch simultaneously; the major part played in the development of the branching process by the internal strain of the body being crushed is noted. L. Gordiyenko.

DATE ACQ: 17Apr64 SUB CODE: ML ENCL: 00

3/3
Card

L 13340-63 EWP(r)/EWP(q)/EWT(m)/BDS AFFTC/ASD EM/JD

ACCESSION NR: AP3002900 S/0148/63/000/006/0130/0137

AUTHOR: Finkel', V. M.; Krotenok, P. I.; Savel'yev, A. M. 59 57

TITLE: X-ray and fractographic studies of steel fracture 18

SOURCE: IVUZ. Chernaya metallurgiya, no. 6, 1963, 130-137

TOPIC TAGS: steel fracture, interference fractography, X-rays, microbeam, transformer steel, impact toughness, interference pattern, interference microscope

ABSTRACT: Authors studied the steel fracture under various test temperatures by interference fractography and X-rays in a flat, widely-converged microbeam. Transformer steel (4% Si) was used for the test. The steel was annealed at 1300C for 12 hours. This increased the grain size from 0.5 to 1 mm. The samples were fractured on an impact tester in a temperature interval from +20 to -120C. This showed that, with a reduction in temperature, the impact toughness decreased from 1 kgm/square cm at 0° to 0.1 - 0.2 kgm/square cm at -180C. Interference patterns of the samples which were fractured at various temperatures differed from each other. X-ray pictures show a reduction in plastic deformation with a drop in temperature. The surface of the fracture was studied by an MII-1 interference microscope. At elevated test temperatures, the surface of the spallation fragment is

Card 1/2

L 13340-63

ACCESSION NR: AP3002900

2

relatively smooth with shallow jogs and irregularities. The interference pattern reflects a small steric curvature of cylindrical type with the axis corresponding to the direction of the crack propagation. X-ray pictures of the cracks are included in the article. Orig. art. has: 5 figures. 18

ASSOCIATION: Sibirskiy metallurgicheskiy institut (Siberian Metallurgical Institute)

SUBMITTED: 21Aug62 DATE ACQ: 24Jul63 ENCL: 00

SUB CODE: 00 NO REF SOV: 015 OTHER: 005

Card 2/2

ACCESSION NR: AR4042234 S/0124/64/000/006/V071/V071

SOURCE: Ref. zh. Mekhanika, Abs. 6V599

AUTHOR: Finkel', V. M.; Berezovskiy, V. N.

TITLE: X-ray investigation of structure of transformer iron under elastic load and in process of relaxation of stresses

CITED SOURCE: Sb. Relaksats. yavleniya v met. i splavakh. M., Metallurgizdat, 1963, 303-308

TOPIC TAGS: steel, transformer steel, x-ray investigation, elastic load, stress relaxation

TRANSLATION: Investigates change of transformer steel substructure, subjected to elastic and plastic flow, and also prolonged macroelastic load. All forms of load and deformation of samples are conducted directly in an X-ray chamber. There is used the method of a wide convergent micro-

bu

Card 1/3

ACCESSION NR: AR4042234

bundle; investigates reflections from planes (310) in CoKα-radiation. There are determined disorientation and degree of perfection fragments in the grain, and also the quantity of reflexes on the X-ray photograph. In the macroelastic region load there is observed mutual turn of fragments in one crystallite, a mutual turn of grains and change of range orientations in radial and azimuthal directions. In region of low plasticity substructural changes, observed under macroelastic load, with transition beyond the limits of elasticity (~30 kg/mm) are developed in the direction of decrease of perfection of crystallites. After small plastic flow there is observed reversibility in change of dimensions and form of reflexes. Prolonged load (1000 - 16000 hrs) in macroelastic region leads to decrease quantity of reflexes on X-ray photograph; disappearance of certain reflexes is partially compensated by appearance of new ones. During prolonged load beyond the limits of elasticity there is observed qualitatively the same phenomenon, intensely occurring basically only at the initial moment of load. Concludes that structural changes in steel both during elastic and low plastic flow, and also under constant load in time have a more or less common character and are the result of consecutive episodical processes of relaxation of stresses in microvolumes. Bibliography: 6 references.

Card 2/3

ACCESSION NR: AR4042234

SUB CODE: MM, OP ENCL: 00

Card 3/3

FINKEL', V.M.; KUTKIN, I.A.; SAVEL'YEV, A.M.; ZRAYCHENKO, V.A.; ZUYEV, L.B.; KOSITSINA, V.K.

Kinetics of the propagation of cracks in bismuth single crystals. Kristalografiia 8 no.5:752-757 S-O '63. (MIRA 16:10)

1. Sibirskiy metallurgicheskiy institut im. S.Ordzhonikidze.

L 18511-63 EWP(q)/EWT(m)/BDS AFFTC/ASD JD/HW

ACCESSION NR: AP3001702 S/0126/63/015/005/0754/0764

59
58

AUTHORS: Finkel', V. M.; Kutkin, I. A.; Belorukov, V. F.

TITLE: Branching of cracks in steel 16

SOURCE: Fizika metallov i metallovedeniye, v. 15, no. 5, 1963, 754-764

TOPIC TAGS: crack in steel, crack branching

ABSTRACT: The formation of crack branching in steel has been photographed by a motion picture camera in order to study kinetics of the process and to investigate microscopically the progress of cracking in the shrinkage zone. Oil-hardened samples of steels ShKh-15 and 85KhV were used and a great variety in branching types was observed (see enclosure). The measurements of crack progress showed that high velocity of crack formation does not necessarily produce branching. It is assumed that the mechanism of branching is based on the magnitude and distribution of residual stresses in the adjacent regions. Tensile forces acting toward the crack from the internal stress field break the advance of the crack, tending to change its trajectory (determined by external tension and sample configuration).

Card 1/3

L 18511-63

ACCESSION NR: AP3001702

Certain portions of steel at the crack front yield under the action of these internal forces, and branching results. Orig. art. has: 7 figures

ASSOCIATION: Sibirskiy metallurgicheskiy institut (Siberian Metallurgical Institute)

SUBMITTED: 26Jul62	DATE ACQ: 11Jul63	ENCL: 01
SUB CODE: ML	NO REF SOV: 003	OTHER: 003

Card 2/3

FINKEL', V.M.; SAVEL'YEV, A.M.; KUTKIN, I.A.; KUROCHKIN, A.F.

Investigating the characteristics of failure in transformer steel. Fiz. met. i metalloved. 15 no.5:781-784 My '63. (MIRA 16:8)

1. Sibirskiy metallurgicheskiy institut im. Ordzhonikidze, Novokuznetsk.

(Steel--Metallography)
(Dislocations in metals)

FINKEL', V.M.; ZRAYCHENKO, V.A.; DEYASHKINA, T.K.

Investigating crack growth in transformer and certain carbon steels. Fiz. met. i metalloved. 16 no.3:448-456 S '63. (MIRA 16:11)

1. Sibirskiy metallurgicheskiy institut imeni S.Ordzhonikidze.

L 11417-63 BDS

S/032/63/029/005/013/022

AUTHORS: Finkel', V. M. Kutkin, I. A. and Krotenok, P. I.

TITLE: On the kinetics of shock testing of metals using high-speed motion pictures

PERIODICAL: Zavodskaya laboratoriya, v. 29, no. 5, 1963, 593-595

TEXT: Destruction by shock created by explosion of an electric detonator was recorded at rates of 60,000 and 120,000 frames/second. Upon contact of the hammer the object at once begins to buckle; no traces of fracture are observed; presumably plastic deformation is spreading during this lag period. Then a bright band appears, indicating localized deformation; the fissure is propagated on this band simultaneously with the propagation of the band itself and at about the same rate. Two types of plastic deformation were established; very intense in the localized zone and much less intense elsewhere. Existing limitations, which can be eliminated, prevent determination of impact ductility by this method as described; it does have the value of introducing new characteristics of strength: lag of failure, velocity of the plastic wave and rate of propagation of the fissure. There are three figures.

ASSOCIATION: Sibirskiy metallurgicheskiy institut im. S. Ordzhonikidze (Siberian Metallurgical Institute imeni S. Ordzhonikidze)

Card 1/1 ja/ck

FINKEL', V.M.; KUTKIN, I.A.

Methods of rapid motion-picture investigation of the growth of cracks in some materials. Zav. lab. 29 no.9:1113-1118 '63.
(MIRA 17:1)

1. Sibirskiy metallurgicheskiy institut imeni S. Ordzhonikidze.

FINKEL', V.M.; KUTKIN, I.A.

Using the method of high-speed motion-picture photography in studying the growth of cracks in solids. Usp.nauch.fot. 9:231-235 '64. (MIRA 18:11)

FINKEL', V.M.; KUTKIN, I.A.

Propagation of cracks in certain single srystals.
Kristallografiia 9 no.2:314-319 Mr-Ap'64. (MIRA 17:5)

1. Sibirskiy metallurgicheskiy institut imeni Ordzhonikidze.

FINKEL', V.M.; ZRAYCHENKO, V.A.; MASLOVSKAYA, Z.A.

Dislocation mechanism of ductile failure of simple crystals of transformer steel. Fiz.met. i metalloved. 18 no.5:798-800 N '64. (MIRA 18:4)

1. Sibirskiy metallurgicheskiy institut im. S.Ordzhonikidze.

L 1307-66 EWT(l)/EWT(m)/EWP(w)/EPF(c)/T/EWP(t)/EWP(b)/EWA(c) LJP(c) JD/JW/GG
ACCESSION NR: AP5012550 UR/0181/65/007/005/1402/1412

AUTHOR: Finkel', V. M.; Savel'yev, A. M.; Zuyev, L. B.; Serebryakov, S. V.; Korobov, Yu. M.; Zuyeva, I. B.

TITLE: Interaction of a crack with dislocation boundaries

SOURCE: Fizika tverdogo tela, v. 7, no. 5, 1965, 1402-1412

TOPIC TAGS: crack propagation, crystal lattice energy, lithium fluoride, crystal imperfection

ABSTRACT: This research was motivated by the lack of published data on the kinetics of interaction between a fast crack and boundaries or subboundaries having different energy levels, or data on the influence of the speed of the crack on the process of overcoming such barriers. There is likewise no information on the time necessary for the crack to break through a subboundary. The authors therefore investigated by polarization-optical and cinematrographic methods the breakthrough of slow and fast cracks through screw and inclined subboundaries with different orientations. The investigations were carried out on rock-salt and lithium-fluoride crystals. Samples measuring 0.3 x 0.6 x 2 cm with initial crack 5--7 mm long were tested with and without annealing. The time intervals necessary for the crack to overcome the boundary and the energy involved in this process were determined experimentally and

Card 1/3

L 1307-66

ACCESSION NR: AP5012550

3

calculated theoretically. The motion of a crack was measured both in air and in an etching solution. Fast crack motion was recorded by two means, photoelectrically and by high speed photography. The methods are briefly described. Crack propagation is stopped by the subboundary for a time ranging from 65×10^{-3} sec to as much as 500×10^{-3} sec, depending on the angle and other factors. In the case of screw boundaries the stopping time did not exceed 16×10^{-6} sec. The relation between the time necessary to break through a subboundary and the energy involved is illustrated in Fig. 1 of the Enclosure, where the continuous curve is the result of theoretical calculations and the horizontal lines are experimental values. The results confirmed the theoretical deduction that much more effort is necessary to push a crack in the etching solution than in air. Orig. art. has: 9 figures and 7 formulas.

ASSOCIATION: Sibirskiy metallurgicheskiy institut im. Sergo Orzhonikidze, Novokuznetsk (Siberian Metallurgical Institute)

44,55

SUBMITTED: 01Dec64 ENCL: 01 SUB CODE: SS

NR REF SOV: 004 OTHER: 007

Card 2/3

L 1307-66

ACCESSION NR: AP5012550 ENCLOSURE: 01

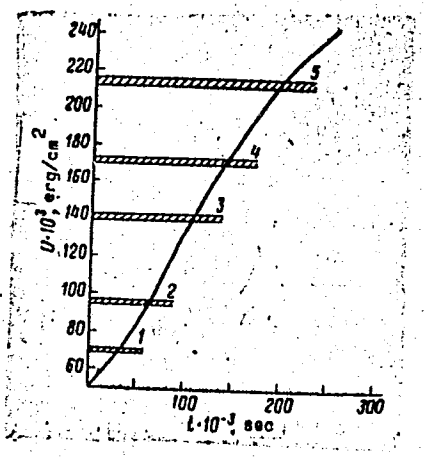


Fig. 1. Graphic interpretation of time necessary for a crack to break through a sub-boundary.

1 - 5 -- Total energy of torsion boundaries with disorientation angles 2°, 3°, 5°, 6°30', and 9°.

Dependence of the elastic energy of cleaved halves of a crystal, represented in the form of a curve crossing the horizontal levels.

Card 3/3

PINKEL', V.M.; KOTKIN, I.A.; BELORUKOV, V.F.

Some peculiarities of crack branching in steel. Izv. vys. ucheb. zav.; chern. met. 8 no.2:106-110 '65.

(MIRA 18:2)

1. Sibirskiy metallurgicheskiy institut.

L 22140-66 EWT(m)/T/EWP(t) IJP(c) JD

ACC NR: AP6012657 SOURCE CODE: UR/0020/65/160/002/0329/0331

AUTHOR: Finkel', V. M.; Zraychenko, V. A.; Voronov, I. N. 58 13

ORG: Siberian Metallurgical Institute im. S. Ordzhonikidze (Sibirskiy metallurgicheskiy institut)

TITLE: Elastic twinning of ferrosilicon

SOURCE: AN SSSR. Doklady, v. 160, no. 2, 1965, 329-331

TOPIC TAGS: silicon alloy, iron, plastic deformation, twinning, dynamic stress, metallography, high speed photography, photographic equipment

ABSTRACT: Elastic twinning of silicon iron with dynamic loading is reported here. The metallographic structure and the high speed photographic equipment are described. Elastic twinning occurs in many metals, but in order to observe it, it is necessary that the loading period be smaller than the period for setting of plastic deformation. This paper was presented by Academician P. A. Rebinder on 16 July 1964. Orig. art. has: 3 figures. [JPRS]

SUB CODE: 20, 11, 14 / SUBM DATE: 14Jul64 / ORIG REF: 011

Card 1/1 BK

FINKEL', V.M.; BEREZOVSKIY, V.N.

Movement of dislocations under the effect of the macroelastic loading of silicon iron. Fiz. met. i metalloved. 20 no.4:597-602 O '65. (MIRA 18:11)

1. Sibirskiy metallurgicheskiy institut imeni S.Ordzhonikidze.

L 04924-67 EWT(m)/EWP(w)/EWP(t)/ETI JD

ACC NR: AP6029679 (N) SOURCE CODE: UR/0369/66/002/004/0388/0393

32
30
B

AUTHOR: Finkel', V. M.

ORG: Siberian Metallurgical Institute, Novokuznetsk (Sibirskiy metallurgicheskiy institut)

TITLE: The autocatalytic nature of brittle fracture

SOURCE: Fiziko-khimicheskaya mekhanika materialov, v. 2, no. 4, 1966, 388-393

TOPIC TAGS: brittleness, brittle fracture, crack propagation, material fracture, mechanical fracture

ABSTRACT: A theory of brittle cracking is based on the model of chemical autocatalysis and chain branching. The destruction of brittle solids is accompanied by plastic deformation and related chain termination. Deterioration of the field of stress in the fracture route proceeds by a branching mechanism with interacting chains. Physical branching of fractures is explained by impulses generated by chain deterioration of the elastic field, advancing by curved trajectories and applying lateral impact upon the cracks. The lower threshold of branching,

Card 1/2

L 04924-67
ACC NR: AP6029679

0.64 V_t, and the specific velocity of crack generation, 0.64 V_L, are shown to have the approximate velocity of Rayleigh waves, V_t or V_L being the velocity of the elastic impulse. The author is sincerely grateful to Yu. N. Rabotnov and V. Ya. Davydovskiy for a discussion of the work and valuable advice. Orig. art. has: 14 formulas and 4 figures.

SUB CODE: 11/ SUBM DATE: 23Apr65/ ORIG REF: 008/ OTH REF: 015

kh

Card 2/2

FINKEL', V.M., kand.fiz.-matem.nauk; KUTKIN, I.A., inzh.; ZUYEV, L.B., inzh.

Growth and branching of cracks in glass. Stek. i ker. 23 no.1: 18-23 Ja '66. (MIRA 19:1)

1. Sibirskiy metallurgicheskiy institut.

L 36399-66 EWT(1)/EWT(m)/T/EWP(t)/ETI IJP(c) JD

ACC NR: AP6018780 SOURCE CODE: UR/0070/66/011/003/0472/0474

AUTHOR: Finkel', V. M.; Serebryakov, S. V.; Lukin, V. P.

ORG: Department of Physics, Siberian Metallurgical Institute (Kafedra fiziki, Sibirskiy metallurgicheskiy institut)

TITLE: The possibility of the existence of Rayleigh waves in cubic single crystals

SOURCE: Kristallografiya, v. 11, no. 3, 1966, 472-474

TOPIC TAGS: cubic crystal, metalloid alloy, Rayleigh wave, single crystal, elastic wave, elastic stress, metal physics

ABSTRACT: Mathematical conditions for the existence of Rayleigh waves in cubic metal crystals are set forth. The conditions for the propagation of these waves on (100) planes, in [100] directions, were stipulated in terms of the existence of positive roots in the known equation

$$\left(1-\frac{c_{11}}{c_{44}}R\right)\left(1-\frac{c_{12}^2}{c_{11}^2}-R\right)^2=R^2(1-R),$$

where $R=\rho c^2/c_{11}$; ρ is density; c is speed of the Rayleigh wave; c_{11}, c_{12} and c_{44} are elastic constants. A similar problem was derived for the (110) planes and [110] directions, since this problem has never been solved quantitatively. The potential energy

UDC: 548.0

Card 1/2

L 36399-66

ACC NR: AP6018780

resulting from elastic stress on cubic crystals was given and the coordinates were transformed so that x and y laid in the (110) plane and z was normal to the plane. The stress components were obtained by partial differentiation of the potential energy with respect to the strain components. The mathematical conditions for the existence of the Rayleigh waves were developed for two cases:

$$\epsilon_{xy} = \epsilon_{xz} = \epsilon_{zz} = 0, \partial/\partial x = 0$$

this corresponding to the wave propagation in the [110] direction on the (110) plane; and the propagation of the waves in the [100] direction on the (110) plane. Calculations were made on the basis of the above mathematical conditions and 33 metallic and nometallic single crystals were tabulated, the results giving the existence or nonexistence of the Rayleigh waves for (100) and (110) planes and [100] and [110] directions. Orig. art. has: 1 table, 14 formulas.

SUB CODE: 20,11/ SUBM DATE: 29Apr65/ ORIG REF: 001/ OTH REF: 004

Card 2/2 MLF

ACC NR: AP7005341 SOURCE CODE: UR/0181/67/009/001/0167/0170

AUTHOR: Finkel', V. M.; Sharafutdinov, R. F.; Shishkin, M. V.

ORG: Siberian Metallurgical Institute im. S. Ordzhonikidze, Novokuznetsk (Sibirskiy metallurgicheskiy institut)

TITLE: Probability of revealing dislocations by a condensation method

SOURCE: Fizika tverdogo tela, v. 9, no. 1, 1967, 167-170

TOPIC TAGS: crystal dislocation phenomenon, electric measurement, vapor condensation, condensation nucleus, crystal surface, SODIUM CHLORIDE

ABSTRACT: The authors advance a hypothesis that dislocations can be observed on the surface of a crystal by means of the electric charge of the dislocations (the condensation method). The method is based on the preferred nucleation of microscopic droplets in saturated liquid vapor on the electric charges. Thest of this method were made on NaCl crystals in an atmosphere of concentrated hydrochloric acide, and affirmative results were obtained. Dislocations could not be revealed in the same atmosphere on LiF crystals, but the morphology of the surface of these crystals was fixed. In the case of NaCl, various tests aimed at checking on the reproducibility of the method were also made and confirmed its feasibility. Inasmuch as the dimensions of the drops produced on the surface of the crystal are much smaller than etch pits, the method has somewhat better resolution than etching, especially at high dislocation densities. This selective arrangement of the drops makes it possible to

Card 1/2

ACC NR: AP7005341

study the fine structure of the surfaces of crystals, and reveal small microscopic irregularities on them. The minimum height of the steps that could be observed by this method was 20 - 30 Å. Orig. art. has: 4 figures.

SUB CODE: 20/ SUBM DATE: 10Jun66/ ORIG REF: 004/ OTH REF: 003

Card 2/2

L 42621-66 EWT(m)/EWP(t)/ETI IJP(c) JD/JG

ACC NR: AP6028715 (N) SOURCE CODE: UR/0185/66/011/008/0922/0923

AUTHOR: Papirov, I. I.; Smyrnov, Yu. M.; Tykhyns'kyy, H. P.; Finkel', V. O. 35 B

ORG: Physicotechnical Institute, AN URSR, Kharkiv (Fizyko-tekhnichnyy instytut AN URSR)

TITLE: Solubility of cerium in beryllium

SOURCE: Ukrayins'kyy fizychnyy zhurnal, v. 11, no. 8, 1966, 922-923

TOPIC TAGS: ~~beryllium cerium alloy, beryllium cerium solid solution~~, SOLUBILITY, LATTICE PARAMETER, BERYLLIUM ALLOY, CERIUM CONTAINING ALLOY

ABSTRACT: An attempt has been made to determine the solubility of cerium in beryllium by measuring the lattice parameters of a beryllium alloy containing 0.35% cerium over

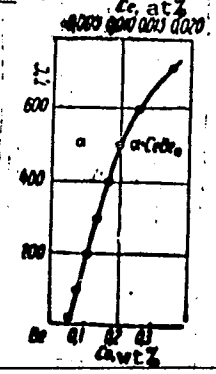


Fig. 1. Solubility of cerium in beryllium versus temperature

Card 1/2

L 42821-66

ACC NR: AP6028715 O

a wide range of temperatures from 1200C to the temperature of liquid nitrogen. The obtained data indicated that at 720C, the solubility of cerium was 0.35% and drops continuously with decreasing temperatures to about 0.06% at room temperature (see Fig. 1). Little or no change occurs with further decreases of temperature to that of liquid nitrogen. Orig. art. has: 3 figures. [AZ]

SUB CODE: 11/ SUBM DATE: 30Mar66/ ORIG REF: 003/ OTH REF: 005/ATD PRESS: 5166

Card 2/2

FINKEL' Ye. A.

Gel'berg, S. I. and Finkel' Ye. A. "Observations of the activity of BCG vaccine in connection with the method of preparing it and the conditions and duration of storage," [With editor's note], Byulleten' In-ta tuberkuleza Akad. med. nauk. SSSR, 1948, No. 4, p. 23-27

So: U-3566, 15 March 53, (Letopis 'Zhurnal 'nykh Statey, No. 13, 1949)

FINKEL', Ye. A. and PROTOPOPOV, N. G.

"The Etiology of Dysentery in Children's Summer Diarrhea," Sbornik Nauchnykh Trudov Kirgizskogo Gosudarstvennogo Meditsinskogo Instituta, Frunze, Vol 7, 1951, pp 259-263.

FINKEL, E. A.

USSR /Microbiology. Medical and Veterinary Microbiology. F-6

Abs Jour: Referat. Zh.-Biol., No. 9, 1957, 35716

Author : Gelberg, S.I.; Finkel, E.A.

Title : A Study of the Acclimatization of the Microbacteria BTsZh by the Method of Marked Cultures in an Experiment

Orig Pub: Zdravookhr. Belorussii, 1956, No. 5, 22-27

Abstract: The acclimatization and the dynamics of the vegetating of microbacteria of the active vaccine BTsZh was studied in guinea pigs and mice by means of a bacteriological study of the lymphatic nodes and the internal organs of the animals after various periods of the injection of the vaccine. It was discovered that an adaptation of the bacteria occurs soon after the injection,

Card 1/3

and during this phase, the screenings show a negative result. After the phase of adaptation, there sets in a phase of maximum reproduction in the lymphatic nodes and internal organ, then passing through a distinct period into a fixed phase. This latter is characterized by a less intensive reproduction of the microbacteria as a result of the development of the immunological reactions of the organism in response to the activity of the vaccine microbes. Gradually this phase is replaced by the phase of a dying of the vaccine infection, the siftings from which yield either sparse growths, or a negative result. To clarify the fate of the microbes, in each of the second vaccinations and revaccinations, strains of BTsZh were used which were resistant to

USSR /Microbiology. Medical and Veterinary Microbiology. F-6

Abs Jour: Referat. Zh.-Biol., No. 9, 1957, 35716

streptomycin and phtivazid. Such resistant strains analyzed as marked since they possessed a selective capability of growth in nourishing media containing corresponding medicinal preparations. By using these strains the authors obtained the ability to distinguish the distribution of the microbes after each of the repeated vaccinations and the continuity of their vegetating.

Card 3/3

GEL'BERG, S.I.; FINKEL', Ye.A.; BELETSKIY, V.I.; DANOVICH, S.M.; TSATSKINA, E.S.

Combined entero-cutaneous method of immunization with BCG vaccine.
Probl.tub. 34 no.4:48-53 Jl-Ag '56. (MLRA 9:11)

1. Iz kafedry mikrobiologii (zav. S.I.Gel'berg) Kirgizskogo meditsinskogo instituta.
(BCG VACCINATION, exper.
entero-cutaneous method of admin. in mice & guinea pigs)

F

Country : USSR
Category : Microbiology-Antibiosis and Symbiosis. Antibiotics

Abs. Jour : Ref Zhur - Biol., No.19, 1958, 86021

Author : Volkovnikova, R.S.; Finkel', Ye.A.; Yefimova, V.A.
Institut. : Kirgiz Scientific Research Institute of Animal*
Title : The Problem of the Effect of Streptomycin and Phthivaside on Mycobacterium tuberculosis of the Avian Type (First Report)

Orig Pub. : Byul. Nauchno-Tekh. Inform. Kirg. N.-I. In-t Zhivotnovodstva i Vet., 1956, No.1-2, 57-61

Abstract : The natural resistance of cultures of avian tubercle bacilli cultures to streptomycin in Gelberg's medium is very high, and complete accomplishment of restraint of growth is seen only in media which contain streptomycin in concentrations of 5000 units per ml. Phthivaside induces a complete cessation of growth of the cultures in concentrations of 40 to 200 gamma/ml. - L.M.Model'

*Husbandry and Veterinary Medicine

Card: 1/1

F

USSR/Microbiology - Microbes Pathogenic for Man and Animals. Bacteria. Mycobacteria.

Abs Jour : Ref Zhur Biol., No 22, 1958, 99509

Author : Gel'berg, S.I., Finkel', Ye.A., Gel'berg, I.S.
Inst : -
Title : Preparation of Labeled Cultures of BCG and Virulent Tuberculous Mycobacteria with the Aid of Antibiotics and Chemotherapeutic Drugs.

Orig Pub : Probl. tuberkuleza, 1957, V. 35, No. 6, 105-108

Abstract : By cultivating for a period of 11 months of the strain BCG-1 and of the virulent strain of tubercle bacilli "Ravenel" on an egg medium in the presence of gradually increasing quantities of streptomycin (S) or phthivazide (P), cultures were obtained which were resistant to 20,000 units of S in 1 ml of the medium (BCG-S and "Ravenel"-S) or to 1,000 of P in 1 ml of the medium (BCG-P and "Ravenel"-P). The obtained resistant strains

Card 1/2

Chair Microbiology 101 - Kirgiz Med. Inst.

USSR/Microbiology - Microbes Pathogenic for Man and Animals. F
Bacteria. Mycobacteria.

Abs Jour : Ref Zhur Biol., No 22, 1958, 99509

of DCG did not differ from the original strain in the activity of multiplication in the organism, and in the sensitizing and immunizing properties. The resistant cultures of the strain "Ravenel" possess a virulence for guinea pigs identical with the original strain. The obtained cultures do not multiply in the presence of other antibiotics towards which they remain sensitive. It is the opinion of the authors that the cultures obtained by them are labeled since they possess biological properties identical to those of the original strains and are easily detected among microbes of this type due to the characteristic of therapeutic resistance. The authors are utilizing these strains in experimental investigations of vaccination and immunity in tuberculosis.
-- G.Ye. Frumkina

Card 2/2

FINKEL', Ye.A., kand.med.nauk

Late antituberculosis revaccination and the experimental basis for its effectiveness [with summary in French]. Probl.tub. 36 no.3: 88-91 '58 (MIRA 11:5)

1. Iz kafedry mikrobiologii (zav. S.I. Gel'berg) Kirgizskogo gosudarstvennogo meditsinskogo instituta.
(TUBERCULOSIS, immunol.
eff. of enteral-epicutaneous revacc. in guinea pigs (Rus))

GEL'BERG, S.I.; FINKEL', Ye.A.

Method of experimental study of immunogenic properties of antituberculosis vaccine and the effectiveness of methods of its use. Probl.tub. 37 no.2:80-84 '59. (MIRA 12:9)

1. Iz kafedry mikrobiologii (zav.S.I.Gel'berg) Kirgizskogo meditsinskogo instituta.
(BCG VACCINATION, exper.
immunogenic properties in guinea pigs (Rus))

FINKEL', Ye.A.

Methods for antituberculosis vaccination and revaccination using BCG. Sov.zdrav.Kir. no.5:32-38 S-O '62. (MIRA 15:10)

1. Iz Kirgizskogo nauchno-issledovatel'skogo instituta tuberkuleza (dir. - prof. Yu.A.Volokh).
(BCG VACCINATION)

FINKEL', Z. N.

"Morphological Changes in the Elastic Tissue of the Kidney due to Hypertonic Disease," Arkhiv. Patol., M v. 11, No. 1, 1949.

Mor., Chair Pathological Anatomy, Kharkov Med. Inst.

NALBAT, A.S., FINKEL', Z.N.

Problem of thrombophlebitic splenomegaly. Sov.med. 22 no.10: 52-56 O '58 (MIRA 11:11)

1. Iz kafedry patologicheskoy anatomii (zav. - prof. G.L. Derman) Khar'kovskogo meditsinskogo instituta (dir. - dotsent I.F. Konenko) i prozektury (zav. prof. G.L. Derman) Oblastnoy klinicheskoy bol'nitsy Khar'kova (glavnyy vrach M.G. Madiyevskiy).
(VEINS, PORTAL SYSTEM. dis.
thrombophlebitis causing splenomegaly (Rus))
(SPLENOMEGALY, etiol. & pathogen.
thrombophlebitis of splenic veins (Rus))

TRUTEN', N.I.; FINKEL', Z.H.

Case of lymphangioma of the spleen. Nov.khir.arkh. no.3:99-100 My-Je '59. (MIRA 12:10)

1. Khar'kovskaya oblastnaya klinicheskaya bol'nitsa.
(SPLEEN--TUMORS)

RABINOVICH, A.P.; FINKEL', Z.N. (Khar'kov)

Functional and morphological changes in the kidneys in experimental diabetes. Probl. endok. i gorm. 9 no.3:43-46 My-Je '63. (MIRA 17:1)

1. Iz protivozobnogo dispansera (glavnyy vrach Ya.M. Zolotovitskiy) i prozektury (zav. - prof. G.L. Derman) Oblastnoy klinicheskoy bol'nitsy (glavnyy vrach V.A. Pizhankova).

DERMAN, G.L.; FINKEL', Z.N.

Morphology of intraepithelial cancer of the cervix uteri. Trudy Inst. eksp. morf. AN Gruz. SSR 11:229-235 '63.
(MIRA 17:11)

1. Kafedra patologicheskoy anatomii Khar'kovskogo meditsinskogo instituta.

ACCESSION NR: AP4011720 S/0055/64/000/001/0021/0028

AUTHORS: Berezin, F. A.; Pokhil, G. P.; Finkel'berg, V. M.

TITLE: Schrödinger equation for system of one-dimensional particles with point interaction

SOURCE: Moscow. Universitet. Vestnik. Seriya 1. Matematika, mekhanika, no. 1, 1964, 21-28

TOPIC TAGS: Schrödinger equation, point interaction, delta function, wave function, scattering theory, elastic theory

ABSTRACT: The Schrödinger equation for n one-dimensional particles of equal mass and point interaction field is given

$$\left[-\sum_{\mu=1}^{n}\frac{\partial^2}{\partial x_\mu^2}-2\lambda\sum_{\mu<\nu}\delta(x_\mu-x_\nu)\right]\psi(x_1\ldots x_n)=E\psi(x_1\ldots x_n),$$

where $x_1,\ldots,x_n$ -particle coordinate, 2λ -interaction constant, and $\delta(x)$ - Dirac delta function. An explicit solution is obtained for the wave function ψ in the form

$$\psi=\exp(ik_1x_{a_1}+\ldots+ik_nx_{a_n}),$$

Card 1/2

ACCESSION NR: AP4011720

where $k_1 \ldots\ldots k_n$ - arbitrary complex numbers. A detailed solution is given for $n = 3$ both in a repulsing and an attracting field. The ψ-functions of the scattering theory are found, satisfying the Lippmann-Schwinger equations, and their completeness (both in coordinate and momentum space) is proved. The scattering operator is constructed in terms of the ψ-functions

$$S(b|a) = \int d^3x \, \overline{\psi_{out}(x|b)} \, \psi_{in}(x|a).$$

and its eigenfunctions and eigenvalues, in particular for symmetric function subspace with elastic scattering, are found. "The authors express their gratitude to the members of the I. Ye. Tamm seminar in FIAN in October 1962." Orig. art. has: 29 equations.

ASSOCIATION: Moskovskiy universitet, Kafedra teorii funktsiy i funktsional'nogo analiza (Moscow University, Department of Theory of Functions and Functional Analysis)

SUBMITTED: 07Feb63 DATE ACQ: 14Feb64 ENCL: 00

SUB CODE: PH NO REF SOV: 003 OTHER: 003

Card 2/2

ACCESSION NR: AP4020581 S/0057/64/034/003/0509/0518

AUTHOR: Finkel'berg, V.M.

TITLE: Dielectric constants of mixtures

SOURCE: Zhurnal tekhnicheskoy fiziki, v.34, no.3, 1964, 509-518

TOPIC TAGS: dielectric constant, misture dielectric constant, effective dielectric constnnt, dielectric constant calculation

ABSTRACT: Formulas are derived for approximately calculating the effective dielectric constant of a mixture of substances, the effective dielectric constant being the ratio of the average displacement to the average field. The dependence of the dielectric constant on frequency is taken into account, and, although the dielectric constant is treated as a scalar, the method can be extended to tensor dielectric constants. Two distinct types of approximation are discussed separately. In the first case treated, the various components of the mixture may be present in any proportions, but their separate dielectric constants are assumed not to differ greatly from each other. The dielectric constant is thus treated as a random variable that never deviates greatly from its mean. The effective dielectric constant

Card 1/3

ACCESSION NR: AP4020581

is obtained from an expansion, the terms of which involve successively higher order moments of a certain function of the dielectric constant. The first approximation is that obtained by V.I.Odelevskiy (ZhTF,21,No.5,678,1951). To discuss the higher approximations, the assumption of "random phases" is employed, whereby the higher moments are expressed in terms of the second moments. The second approximation is calculated for several simple forms of the second moment. The second order correction is small provided the wavelength is long compared with the correlation length, but the higher order corrections can be appreciable even at zero frequency. The second case treated is that of a number of spherical inclusions in an otherwise homogeneous matrix. The treatment can be extended to the case of nonspherical inclusions. The inclusions may have arbitrary dielectric constants, but their concentrations are assumed to be small. The effective dielectric constant is obtained from an expansion in powers of the concentrations. The derivation of this expansion is performed in part by a method employed by W.F.Brown(J.Chem.Phys.23,1514,1955). The n-th degree term of the expansion involves the n-th order distribution function and coefficients obtained from the solution of the problem of n spheres in an external field. The first and second degree terms are obtained, the spheres being assumed to be as nearly randomly distributed as their finite size permits. The first degree

Card 2/3

ACCESSION NR: AP4020581

term is that obtained long ago by O.Wiener (Abhandl d. Leipz.Acad.,82,509,1912). "The author is deeply grateful to A.A.Vedenov for suggesting the problem and for his constant assistance in its solution, and to M.A.Leontovich for discussing the work." Orig.art.has: 64 formulas and 2 figures.

ASSOCIATION: none

SUBMITTED: 04Apr63 DATE ACQ: 31Mar64 ENCL: 00

SUB CODE: PH NR REF SOV: 003 OTHER: 007

Card 3/3

ACCESSION NR: AP4019242 S/0056/64/046/002/0725/0731

AUTHOR: Finkel'berg, V. M.

TITLE: Mean field strength in an inhomogeneous medium

SOURCE: Zhurnal eksper. i teor. fiz., v. 46, no. 2, 1964, 725-731

TOPIC TAGS: field in inhomogeneous medium, mean value, statistical mean, random function, random inclusion distribution, expansion in moments, expansion in concentration, electromagnetic field, dielectric constant, nonpolar molecule gas, medium with spherical inclusions, time independent solution

ABSTRACT: In view of the statistical nature of many properties involved in the propagation of heat, sound, and electromagnetic waves in a medium with random inhomogeneities or in scattering of electrons by impurities in the crystal, a general analysis is made of a field in an inhomogeneous medium that can be described statistically with

Card 1/3

ACCESSION NR: AP4019242

the aid of a random function or a random distribution of inclusion. Time independent equations are considered. The equation which governs the mean value of the field is expanded in terms of the moments of the random function or in terms of the powers of the inclusion concentration. Among the examples considered are an electromagnetic field (which has singularities connected with the singularity of its Green's function), the dielectric constant of a gas of nonpolar molecules, and the effective dielectric constant of a medium with spherical inclusions. New formulas have been derived in the last two examples, differing from the results of earlier investigations. Some inconsistencies in work by others are also pointed out. "The author is grateful to A. A. Vedenov, M. A. Leontovich, and V. Ya. Faynberg for a discussion and valuable remarks." Orig. art. has: 17 formulas.

ASSOCIATION: Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta (Nuclear Physics Institute, Moscow State University)

Card 2/3

FINKEL'BERG, V.M.

Virial expansion in the problem of electrostatic polarization of a system of many bodies. Dokl. AN SSSR 152 no.2:320-323 S '63. (MIRA 16:11)

1. Moskovskiy gosudarstvennyy universitet im. M.V. Lomonosova. Predstavleno akademikom M.A. Leontovichem.

FINKEL'BERG, V.M.

Mean field strength in an inhomogeneous medium. Zhur. eksp. i teor. fiz. 46 no.2:725-731 F '64. (MIRA 17:9)

1. Institut yadernoy fiziki Moskovskogo gosudarstvennogo universiteta.

L 17018-66 EWT(1) GW/WS-2
ACC NR: AP6007271 SOURCE CODE: UR/0053/66/088/002/0399/0401

AUTHOR: Lotova, N. A.; Finkel'berg, V. M.

ORG: none

TITLE: Interplanetary scintillations of radio sources and their use in astrophysics

SOURCE: Uspekhi fizicheskikh nauk, v. 88, no. 2, 1966, 399-401

TOPIC TAGS: radio source, radio telescope, directivity diagram, radio diffraction method, radio oscillation method, point shaped source, solar supercorona

ABSTRACT: The determination of angular dimensions of radio sources depends upon the resolving power of radiotelescopes or, more precisely, upon the directivity diagram. Radiotelescopes with a 1-km base working on meter waves have a directivity diagram from 3' to 20', which is inadequate for studying small objects. Since 1950, the method of cosmic radioemission diffraction at the rim of the lunar disk has been used. This method yields a resolving power approximately equal to 20"; it was used for studying the Crab nebula. In 1958, V. L. Ginzburg recommended the scintillation method for studying radio sources. The principle of this method consists in the diffraction of radio waves passing through

Card 1/2 UDC: 523.164