SILIN, E., inzh.

Electric warm-up of motor-vehicle engines in winter with outdoor parking. Na stroi. Ros. 3 no.10:26-27 O '62. (MIRA 16:6)

(Motortrucks—Cold weather operation)

L 15960-66 EWT(1)

ACC NR: AP6001483 SOURCE CODE: UR/0368/65/003/006/0563/0566

AUTHOR: Silin', E. A.; Taganov, K. I.

ORG: None

TITLE: The evaporation mechanism of small quantities of matter in spectral light sources

SOURCE: Zhurnal prikladnoy spektroskopii, v. 3, no. 6, 1965, 563-566

TOPIC TAGS: spectrophotographic analysis, light source, evaporation, spectral line

ABSTRACT: In spectral analysis of samples with limited mass, the intensity of spectral lines varies with time. Many authors investigating the kinetics of evaporation of small amounts of matter established various kinds of analytical relationships. The present paper presents the results of experimental investigations which seem to be in good agreement with the theoretically derived expression $I = Ax \exp(-\beta t) \cdot [1 - \exp(-\alpha t)]$ similar to an expression proposed earlier by A. G. Nepokoychitskiy and A A Yankovskiy (Vestsi An BSSR, ser. fiz.-tekhn. navuk, No. 3, 124, 1963; DAN BSSR, 7, 814, 1963). The mean square deviation of the theoretical from the experimental values, for the various cases, is within 2—10%.

Card 1/2 UDC: 543.42

L 15960-66

ACC NR: AP6001483

Coefficients A, β, and α are directly related to evaporation conditions in the light source. The theoretical curves can be used successfully for the investigation of the influence of various parameters (voltage, polarity, current pulse duration, etc.) on the contact spark transfer of matter, and of the physical processes in spectral light sources. Orig. art. has: 3 formulas, 2 figures, and 2 tables.

SUB CODE: 07 / SUBM DATE: 23Mar65 / ORIG REF: 010

20/

bvk

Card 2/2

ACC NR: AT7006579 SOURCE CODE: UR/0364/66/002/012/1420/1425

AUTHOR: Gaylis, A. K.; Silin', E. A.; Froymanis, Ya. F.

ORG: Latvian State University, Riga (Latviyskiy gosudarstvennyy universitet)

TITLE: Study of the volt-ampere characteristics of thin film systems of a series of indone compounds

SOURCE: Elektrokhimiya, v. 2, no. 12, 1966, 1420-1425

TOPIC TAGS: volt ampere characteristic, indone, thin film

ABSTRACT: The volt-ampere characteristics of thin films prepared from systems of the series of 2-arylindones and their derivatives, which had different tendencies toward polyassociation, were measured. The systems studied were metal/indone compound/metal systems. The indone compounds were deposited on glass substrates between Au-Au, Ag-Ag and Al-Au electrodes, and the measurements were taken in a vacuum of 10^{-5} mm. It is shown that the thin films have nonlinear volt-ampere characteristics of the type $J = AU^{\beta}$, where the nonlinearity coefficient β assumes a series of discrete values as the voltage U increases, A being a proportionality factor. A correlation is established between the character of the change in coefficient β and the magnitude of the intermolecular interaction of the corresponding group of indone compounds. It is suggested that the observed nonlinearity of the volt-ampere characteristics is mainly due to the formation of additional current carriers in the film of the organic compound

Card 1/2 UDC: 621.315.592:547

ACC NR: AP7006579

under the influence of the electric field; the nonlinear increase of the current through the system with rising electric field strength depends substantially on the nature of the intermolecular interaction in the given compound. Orig. art. has: 3 figures and 3 formulas.

SUB CODE: 07/ 20/ SUBM DATE: 11Oct65/ ORIG REF: 007/ OTH REF: 001

Card 2/2

L 21143-66 EWT(m)/EWP(j)/T/EWA(h)/EWA(l) IM
ACC NR: AP6003503 SOURCE CODE: UR/0364/66/002/001/0117/0122

AUTHOR: Silin', E. A.; Motorykina, V. P.; Shmit, I. K.; Geyderikh, M. A.; Davydov, B. E.; Krentsel', B. A.

ORG: Latvian State University (Latviyskiy gosudarstvennyy universitet); Institute of Petrochemical Synthesis, Academy of Sciences SSSR (Institut neftekhimicheskogo sinteza Akademii nauk SSSR)

TITLE: Structural changes in polyacrylonitrile during infrared irradiation

SOURCE: Elektrokhimiya, v. 2, no. 1, 1966, 117-122

TOPIC TAGS: polyacrylonitrile, IR absorption spectrum, electron spectrum

ABSTRACT: The purpose of this investigation was to study the effect of intense radiation on polyacrylonitrile. The selective interaction of radiation on the vibrational energy of individual groups of polyacrylonitrile molecules was assumed. The use of a concentrated IR beam was used to obtain a polyacrylonitrile film with treated sections of a given geometric configuration and degree of conversion. Polyacrylonitrile film was obtained by redox initiation with an average molecular

UDC: 621.315.592 : 547

Card 1/3

weight of 23000-36000. The films were prepared from 3% polyacrylonitrile solution in dimethylformamide and kept in vacuum to a constant weight. The film thickness was 8-12 microns. The films were irradiated in 10^{-5}-10^{-6} mm pressure chamber through a quartz window about 100 mm from the light source. The spectra of irradiated samples were obtained in air at room temperature. Electronic absorption spectra were taken on an SF-4 spectrophotometer and vibrational spectra were taken on an IKS-14 spectrophotometer. It was found that infrared irradiation produces significant changes in the vibrational absorption spectra of polyacrylonitrile. The IR irradiation increases the mobility of hydrogen in tertiary carbon and facilitates its migration to the nitrile group, >C=NH, which, in turn, produces intermolecular cross-linking. The hydrogen band is formed between the >C=NH group and the neighboring nitrile group. This scheme is supported by the appearance of the diffuse absorption band, shifted toward the 3.45 cm^{-1} region, which is assigned to the valence vibrations of the >N-H...N≡C-group. Electronic spectra also indicate the formation of polyunsaturated bonds. The comparison of the vibration absorption spectra of polyacrylonitrile upon thermal treatment with those of the same material irradiated with IR show that both in their initial and subsequent stages, the conversion process during IR irradiation differs from the conversions which take place during thermal treatment. Conversion of polyacrylonitrile during IR irradiation

APPROVED FOR RELEASE: 08/23/2000 CIA-RDP86-00513R001550610007-6"

L 21143-66
ACC NR: AP6003503

proceeds by the self-accelerating reaction scheme, the rate of which is significantly higher than during thermal treatment. A. E. Krumin participated in the experimental part of this work. Orig. art. has: 3 figures.

SUB CODE: 07/ SUBM DATE: 27Apr65/ ORIG REF: 008/ OTH REF: 012

Card 3/3 UDC

L 29328-66 EWP(j)/EWT(m)/T IJP(c) RM/DS/JW
ACC NR: AP6018984 SOURCE CODE: UR/0364/66/002/006/0732/0734

AUTHOR: Silin', E. A.; Plumane, D. E.

ORG: Latvian State University im. Petr Stuchka (Latviyskiy gosudarstvennyy universitet)

TITLE: Study of certain electrophysical properties of low-molecular-weight charge-transfer complexes introduced into polymer films

SOURCE: Elektrokhimiya, v. 2, no. 6, 1966, 732-734

TOPIC TAGS: organic semiconductor, charge transfer complex, photoconductive material

ABSTRACT: The electrical properties of low-molecular-weight charge-transfer complexes (CTC) are usually studied with donor-acceptor multilayer specimens, as with powder or film specimens prepared by depositing CTC from solutions. However, the reproducibility of electrical measurements using low-molecular-weight CTC films deposited from solution is poor owing to nonhomogeneity. Therefore, a study has been made of the feasibility of preparing new polymeric photosensitive semiconductors, whose properties can be predetermined by introducing CTC in polymer film "matrices." The acceptor, p-chloranil (PCA), and the donor, p-phenylenediamine (PPD), were introduced into polyacrylonitrile

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L 29328-66
ACC NR: AP6018984

(PAN) films by deposition from 0.05M PPD + 0.05M PCA + 3% PAN solutions in dimethylformamide. This method yielded strong homogeneous films of the PPD + PCA complex and PAN. The complex in the film exhibited considerable photosensitivity in the near UV, visible, and IR regions of the spectrum. The results of measurements of the volt-ampere characteristics of the photo- and dark conductivity, absorption spectra, and photocurrent kinetics of the complex in PAN films are given in the source. The experimental data obtained confirmed the assumption that low-molecular-weight CTC introduced into polymer matrices form new types of organic semiconductors which exhibit considerable photoconductivity in a broad region of the spectrum. Orig. art. has: 4 figures. [BO]

SUB CODE: 11, 20/ SUBM DATE: 040ct65/ ORIG REF: 003/ OTH REF: 006
ATD PRESS: 5010

Card 2/2

SILIN, G.M.; PESTRIKOVA, K.L.

Joint brigades in long wall mines. Ugol' 31 no.11:35-36 N '56. (MLRA 10:2)

1. Urgal'skoye shakhtoupravleniye.
(Bureya Basin--Coal mines and mining)

* For degree of Doctor of Technical Sciences

USSR/Chemical Technology - Chemical Products and Their Application. Fermentation Industry. I-12

Abs Jour : Ref Zhur - Khimiya, No 1, 1958, 2901

Author : Silin, G.N., Budovskiy, P.I.

Inst : All-Union Scientific Research Institute of the Brewing Industry.

Title : Efficient Method of Producing Wort for Bread Kvass (Plant Tests and Putting Into Practice)

Orig Pub : Tr. Vses. n.-i. in-ta pivovar. prom-sti, 1957, No 6, 150-161

Abstract : The performed plant-scale experiments have proficed a detailed standard procedure for the manufacture of bread kvass according to an efficient method, which comprises a preliminary hot steeping of aged rye malt and rye flour and a subsequent saccharification with barley malt.

Card 1/2

[illegible] mixture being hot-steeped, to 55% (ratio of water to weight of steeped products 1:1); saccharification of the hot-steeped mixture with barley malt under the following conditions: addition of malt at 60°, increase of the temperature of the mash to 64° within 8 minutes and holding at this temperature for 30 minutes, increase of the temperature to 72° within 12 minutes, holding for 20 minutes, heating to 90° within 28 minutes. To accelerate clarification of the wort it is proposed to utilize a cyclone separator, the description of which is included as well as the results obtained on testing it. On putting into practice of this efficient procedure the prime cost of one hectoliter of kvass is lowered by at least 11 rubles 17 kopecks.

Card 2/2

SILIN, G.N.; FEDOROV, A.G.; KRUGLOVA, G.I., red.; SOKOLOVA, I.A., tekhn.red.

[Producing rye malt for making kvass] Proizvodstvo rzhanogo soloda dlia kvasovareniia. Moskva, Pishchepromizdat, 1958. 56 p.

(Kvass) (Malt) (MIRA 12:6)

NEKAYEV, P. (st. Shakhun'ya, Gor'kovskoy zheleznoy dorogi); BUROV, V. (g.Kyzyl); SILIN, I., neshtatnyy instruktor; BORODKO, I. (g.Vorkuta); NAZAROV, N. (g.Ural'sk); MOSHKOV, P.; SHMYGANOVSKIY, V.

People talk, advise and criticize. Sov. profsoiuzy 18 no.4: 26-27 F '62. (MIRA 15:3)

1. Belgorodskiy oblastnoy sovet profsoyuzov po Korochanskomu rayonu (for Silin). 2. Neshtatnyy korrespondent zhurnala "Sovetskiye profsoyuzy" (for Borod'ko, Shmyganovskiy). 3. Predsedatel' soveta fotokluba Vologodskogo Dvortsa kul'tury zheleznodorozhnikov (for Moshkov).

(Trade unions)

PETROV, L.V.; SILIN, I.G.

Banded recording of time marks on seismograms transferred from magnetic films. Razved. i prom. geofiz. no. 34:39-45 '60. (MIRA 13:12)

(Seismic prospecting)

SILIN, I. N., AMAGLOBELI, N. S., KAZATINOV, YU. M., SOKOLOV, S. N.,

"Determination of the Coupling Constant of Pion-Nucleon Interaction by Differential Cross Section for Elastic (NP)- Scattering at 90, 380 - 500, 630 Mev"

paper presented at the Intl Conference on High Eneegy Physics, Rochester, N. Y. and/or Berkly California, 25 Aug - 16 Sep 1960.

S/056/60/039/004/007/048
B004/B070

24.6900

AUTHORS: Amaglobeli, N. S., Kazarinov, Yu. M., Sokolov, S. N., Silin, I. N.

TITLE: Determination of the Constant of the π-Meson - Nucleon Interaction on the Basis of the Differential Cross Section of Elastic np-Scattering

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960, Vol. 39, No. 4(10), pp. 948-953

TEXT: In the introduction, the authors discuss the determination of the pion - nucleon interaction constant f suggested by G. F. Chew (Ref. 1). They discuss the different values obtained for f, which can not be explained as being due to experimental errors. In order to clarify this problem, they evaluate all the available data on np scattering for 90, 380-400, and 630 Mev (Refs. 2,3) for determining the constant f taking account of both the poles of the real part of the np scattering amplitude. They start out from the equation (1):

84389

Determination of the Constant of the π-Meson - Nucleon Interaction on the Basis of the Differential Cross Section of Elastic np-Scattering

S/056/60/039/004/007/048
B004/B070

$\sigma_{np}(\vartheta) = a_1 b^2 \left[1/(x_0 - x)^2 + 4/(x_0 + x)^2\right] + a_2/(x_0 - x) + a_3/(x_0 + x) + \sum_{n=0}^{n_{max}} a_n x^n$, where $x_0 = 1 + \mu^2/2k^2$, $x = \cos\vartheta$, $b = \mu^2/2k^2$, a_1, a_2, ... a_n are coefficients which are calculated by the method of least squares. The results are given in Tables 1 - 4. The authors come to the conclusion that the experimental data in the energy range studied do not contradict a constant value for $f^2 = 0.08$. However, for a more rigorous demonstration of the validity of equation (1), a further accuracy is required. The regions of ϑ in which a greater accuracy is particularly required are shown in a diagram. The authors thank Professor Ya. A. Smorodinskiy, and Professor B. M. Pontekorvo for discussions, and I. N. Kukhtina for collaboration in the work. There are 1 figure, 4 tables, and 9 references: 2 Soviet, 5 US, 1 German, and 1 Italian.

Card 2/3

DO IN SEB; KIRILLOVA, L.F.; MARKOV, P.K.; POPOVA, L.G.; SILIN, I.N.; TSYGANOV, E.N.; SHAFRANOVA, M.G.; SHAKHBAZYAN, B.A.; YULDASHEV, A.A.

[Proton-proton scattering at an energy of 8.5 Bev] Rasseyaniye protona na protone pri energii 8,5 Bev. Dubna, Ob"edinennyi in-t iadernykh issledovanii, 1961. 17 p. (MIRA 14:12)

1. Fiziko-tekhnicheskiy institut AN Uzbekskoy SSR (for Yuldashev).
(Protons--Scattering)

LYU YUYAN' [Liu Yüan]; PYATOV, N.I.; SOLOV'YEV, V.G.; SILIN, I.N.; FURMAN, V.I.

Properties of strongly deformed nuclei. Zhur. eksp. i teor. fiz. 40 no.5:1503-1510 My '61. (MIRA 14:7)

1. Ob"yedinennyy institut yeadernykh issledovaniy.
(Nuclei, Atomic)

KAZARINOV, Yu.M.; KISELEV, V.S.; SILIN, I.N.; SOKOLOV, S.N.

Determination of the π-meson - nucleon interaction constant from the differential cross sections of elastic pp-scattering. Zhur.eksp.i teor.fiz. 41 no.1:197-198 Jl '61. (MIRA 14:7)

1. Ob"yedinennyy institut yadernykh issledovaniy.
(Protons--Scattering) (Mesons) (Nucleons)

S/056/61/041/006/010/054
B108/B138

AUTHORS: To Ying Hsieh, Kirillova, L. F., Markov, P. K., Popova, L. G., Silin, I. N., Tsyganov, E. N., Shafranova, M. G., Shakhbazyan, B. A., Yuldashev, A. A.

TITLE: 8.5-Bev proton-proton scattering

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 41, no. 6(12), 1961, 1748-1756

TEXT: Continuing previous work (V. B. Lyubimov et al. ZhETF, 37, 910, 1959; P. K. Markov et al. ZhETF, 38, 1471, 1960) the authors studied elastic proton-proton scattering at energies of 8.5 Bev, using photographic emulsions of the НИКФИ-БР (NIKFI-BR) type. The primary proton beam of $(2.01 \pm 0.05)\cdot 10^5$ particles/cm^2 (from the proton synchrotron of the Joint Institute of Nuclear Research) struck the emulsion perpendicularly. The emulsion contained $(2.90 \pm 0.06)\cdot 10^{22}$ hydrogen atoms per cm^3. 354 elastic scattering events (plus 145 of previous work) were found. The elastic scattering cross section was 8.74 ± 0.40 millibarns. Conclusions: (1) The mean square p-p interaction radius is

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8.5-Bev proton-proton scattering

$(1.15 \pm 0.05) \cdot 10^{-13}$ cm. (2) The departure of experimental from calculated results is three times the overall error. This is due to neglect of the dependence of scattering amplitude on proton spin states, and to neglect of its real part, both of which were confirmed by experiment. However, the real part does not exceed half of the imaginary part. The authors thank V. I. Veksler for his interest, and K. D. Tolstov for collaboration.
There are 4 figures, 2 tables, and 11 references: 6 Soviet and 5 non-Soviet. The three most recent references to English-language publications read as follows: G. Von Dardel et al. Phys. Rev. Lett., 5, 333, 1960; A. Ashmore et al. Phys. Rev. Lett., 5, 576, 1960; Y. K. Lim et al. Suppl. Nuovo Cim., 15, 382, 1960.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research). Fiziko-tekhnicheskiy institut AN Uzbekskoy SSR (Physicotechnical Institute AS Uzbekskaya SSR) (A. A. Yuldashev)

SUBMITTED: June 21, 1961

KAZARINOV, Yu.M.; SILIN, I.N.; SARANTSEVA, V.R., tekhn. red.

[Phase shift analysis of nucleon-nucleon scattering at energies of 40, 95, 147, 310 Mev] Fazovyi analiz nuklon-nuklonnogo rasseianiia pri energii 40, 95, 147, 310 Mev. Dubna, Ob"edinennyi in-t iadernykh issledovanii, 1962. 16 p. (MIRA 15:6)
(Nucleons—Scattering)

SOKOLOV, S.N.; SILIN, I.N.

Determination of the coordinates of the minima of functionals by the linearization method. Dubna, Ob"-edinennyi in-t iadernykh issledovanii, 1962. 19 p.
(No subject heading)

KAZARINOV, Yu. M., LEBAR, F., and SILIN, I. N.

"Application of Conformal Mapping to the Extrapolation of Experimentally Observed Dependences to the Unphysical Region"

report presented at the Intl. Conference on High Energy Physics, Geneva, 4-11 July 1962

Lab. of Nuclear Problems
Lab. of Theoretical Physics

24 (6,20)

S/056/62/043/002/045/053
B100/B102

AUTHORS: Kazarinov, Yu. M., Silin, I. N.

TITLE: Phase shift analysis of nucleon-nucleon scattering at 210 Mev

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43, no. 2(8), 1962, 692-701

TEXT: A phase shift analysis was made of np and pp-scattering at 210 Mev. Two sets of phase shift were chosen from the solutions obtained. Upon extrapolation to 310 Mev they correspond to the sets no. 1 and no. 2 as found by H. P. Stapp et al. (Phys. Rev., 105, 302, 1957) in pp-scattering experiments. The pion-nucleon interaction constant was for all solutions near 0.08 ± 0.02. For $l > 3$, nucleon-nucleon scattering can be described adequately in single-meson approximation. Nucleons in states with different isotopic spins interact with equal intensity. There are 6 figures and 3 tables.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

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h1133
S/056/62/043/004/036/061
B108/B102

24.4310

AUTHORS: Kazarinov, Yu. M., Silin, I. N.

TITLE: Phase shift analysis of nucleon-nucleon scattering at energies of 40, 95, 147, and 310 Mev

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43, no. 4(10), 1962, 1385-1393

TEXT: Phase shift analysis of np and pp-scattering was carried out by a method described earlier (ZhETF, 43, 692, 1962). Evaluation of published data showed that the experimental data between 95 and 310 Mev are consistent with the idea that the scattering amplitude from orbital angular momenta $l \geq 3$ on is given in single-meson approximation with sufficient accuracy. The mean value of the pion-nucleon interaction constant was found to be 0.078 ± 0.003 which agrees well with the value from np-scattering experiments ($f^2 = 0.080 \pm 0.002$). The phase shifts of the individual waves are shown in Figs. 2 and 3. The phase shifts of the waves $t = 0$ and $t = 1$ have the same magnitude on the average. Thus, in the energy range studied, nucleons in states which differ in isotopic spin interact with equal strengths.

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S/056/62/043/004/036/061
B108/B102

Phase shift analysis of...

There are 3 figures and 7 tables.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: April 23, 1962

Fig. 2. Energy dependence of the phase shifts of the waves $^1F_3$, $^3F_2$, $^3F_3$, $^3F_4$.

Fig. 3. Energy dependence of the phase shifts of the waves $^1S_0$, $^3S_1$, $^1P_1$ $^3P_0$, $^3P_1$, $^3P_2$, $^1D_2$, $^3D_1$, $^3D_2$, $^3D_3$.

Card 2/4 2

S/056/63/044/001/052/067
B187/B102

AUTHORS: Kazarinov, Yu. M., Legar, F., Silin, I. N.

TITLE: Application of conformal mapping to extrapolating functions observed on scattering of high-energy particles in the nonphysical region

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 44, no. 1, 1963, 311-315

TEXT: Determination of the coupling constants f^2 of the pion-nucleon interaction requires the analytical continuation of functions found experimentally in the nonphysical region. The same is true of determining the spectral functions of the scattering amplitude. According to W.R. Frazer (Phys. Rev., 123, 2180, 1961) the solution of this problem can be simplified considerably by the conformal mapping

$$w = \left[1 - \sqrt{\frac{b}{a}\left(\frac{a-x}{b+x}\right)}\right] \Big/ \left[1 + \sqrt{\frac{b}{a}\left(\frac{a-x}{b+x}\right)}\right], \quad (1)$$

Card 1/3

Application of conformal mapping to ...

in the unit circle. $x = \cos\vartheta$ and a,b lie on the real axis and are boundaries of the region to be mapped in the unit circle. f^2 is calculated from the differential elastic cross sections σ_{np} at 90, 200, 380 - 400 and 630 Mev, and σ_{pp} at 147 and 380 Mev, the branch point at $x = \pm a_o = \pm (1 + 4\mu^2/mT)$ being taken into account or neglected. m is the mass of the nucleon and μ that of the pion; T is the kinetic energy of the nucleon in the lab system. $f^2 \approx 0.05 - 0.08$ is obtained with an error of ± 10-15%. Furthermore, the pole order of the nucleon-nucleon scattering amplitude in the $x = \cos\vartheta$ plane is determined at $x = \pm (1 + \mu^2/mT)$. According to I.Chulli, S. Chulli, and Ya. Fisher (Preprint OIYaI,D-832, 1951; Nuovo Cim., 23, 1129, 1962), the conformal mapping (1) considerably simplifies the extrapolation of the scattering amplitude $M(\omega)$ in the region of spectral functions. The power series to be approximated for the expression $M(\omega)\sqrt{a_o^2 - x^2}$, which is to be extrapolated, goes over into a Fourier series. The sum of the even terms of the latter determines the jump in the cross section. The effective spectral function is determined for the elements

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Application of conformal mapping to ... S/056/63/044/001/052/067
B187/B102

M_{ss}, M_{11}, M_{oo}, M_{o1}, and M_{1o} of the transition matrix of np-scattering and pp-scattering at 147, 210, and 310 Mev. The spectral function exhibits definite oscillatory behavior. The inaccuracy of the experimental data allows no detailed determination.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institute of Nuclear Research)

SUBMITTED: August 1, 1962

Card 3/3

L 17637-63 EWT(m)/BDS AFFTC/ASD S/056/063/044/003/044/053 53 52

AUTHOR: Zul'karneyev, R. Ya. and Silin, I. N.

TITLE: Phase shift analysis of elastic 660 Mev pp-scattering 19

PERIODICAL: Zhurnal eksperimental'noy i tekhnicheskoy fiziki, v. 44, no. 3, 1963, 1106-1110

TEXT: The Mandelstam model (Ref. 1: Proc. Roy. Soc., 224, 491, 1958) seems to describe quite well the inelastic pp interaction at 660 Mev. According to it, the phase shift analysis should assume the pion production in only the $^1D_2$ and $^3P_{0,1,2}$ states and neglect the imaginary part of the scattering phase shifts for the $^3F_{2,3,4}$ and $^1S_0$ states. The author carried out the analysis with the aim of obtaining the picture of the pp interaction in various spin states away from the pion production threshold and get information needed for the design of further 600 Mev pp-scattering experiments on the synchro-cyclotron in Dubna. The analysis follows in many respects the papers by Yu. M. Kazarinov and I. N. Silin (Ref. 2: ZhETF, 43, 692, 1962; Ref. 3: Preprint OIYaI, R-970, 1962) and is based on the differential cross section and polarization data, $D(\vartheta)$ and $R(\vartheta)$ parameters, the

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S/056/63/044/003/044/053

L 17637-63

Phase shift analysis...

values of $C_{nn}(\vartheta)$ and $C_{kp}(\pi/2)$, and the values of the total pp cross section as supplied by various teams of Soviet researchers. A single phase shift set was obtained in the interval $\chi^2 \leq \chi^2 \leq 2\chi^2$ and four sets in the interval $2\chi^2 \leq \chi^2 \leq 3\chi^2$. Angular dependences of the quantities $\epsilon(\vartheta)$, $P(\vartheta)$, $C_{nn}(\vartheta)$, $C_{kp}(\vartheta)$, $D(\vartheta)$, $R(\vartheta)$, and $A(\vartheta)$ were calculated on the basis of the most probable phase shift set. There are 3 figures and 1 table.

ASSOCIATION: Ob"yedinennyy institut yadernykh issledovaniy (Joint Institut for Nuclear Research)

SUBMITTED: October 30, 1962

Card 2/2

KAZARINOV, Yu.M.; KISELEV, V.S.; SILIN, I.N.

Phase shift analysis of nucleon-nucleon stattering at 147 Mev.
Zhur. eksp. i teor. fiz. 45 no.3:637-642 S '63. (MIRA 16:10)

1. Ob"yedinennyy institut yadernykh issledovaniy.
(Nucleons--Scattering)

ZUL'KARNEYEV, R.Ya.; SILIN, I.N.

Phase shift analysis of pp-scattering at 660 Mev., taking relativistic effects into account. Zhur. eksp. i teor. fiz. 45 no.3:664-671 S '63. (MIRA 16:10)

1. Ob"yedinennyy institut yadernykh issledovaniy.
(Protons--Scattering)

LOGUNOV, A.A.; MESTVIRISHVILI, M.A.; SILIN, I.N.

[Asymptotic behavior of the scattering amplitude at large transfers of momentum] Asimptoticheskoe povedenie amplitudy rasseianiia pri bol'shikh peredavaemykh impul'sakh. Dubna, Ob"edinennyi in-t iadernykh issledovanii, 1965. 27 p. (MIRA 19:1)

AFANAS'YEV, Aleksandr Porfir'yevich; GUSEV, Simon Stepanovich; KRISTAL'NYY, Vladimir Samoylovich; RAMENSKIY, Boris Nikolayevich, redaktor; ROZENBERG, Yakov Grigor'yevich; SILIN, Konstantin Fedorovich; GAVRILOV, A.V., redaktor; SOKOLOVA, M.Ya., tekhnicheskiy redaktor.

[Establishing electric and radio communication facilities in the district] Ekspluatatsiia sredstv elektrosviazi i radiofikatsii v raione. Moskva, Gos.izd-vo lit-ry po voprosam sviazi i radio, 1955. 187 p. (MLRA 8:12)
(Telecommunication) (Radio)

RAMENSKIY, Boris Nikolayevich,; SILIN, K.F., otv. red.; SIDOROVA, T.S., red.; MARKOCH, K.G., tekhn. red.

[Organization of district electric communications] Organizatsiia elektrosviazi v raione. Moskva, Gos. izd-vo lit-ry po voprosam sviazi i radio, 1958. 46 p. (MIRA 11:11)
(Telephone)

SILIN, K.S., inzhener; KARPINSKIY, V.I.

Building bridge supports on precast tubular reinforced concrete piles. Transp. stroi. 6 no.10:24-27 O '56. (MLRA 10:1)
(Wuhan, China--Bridge construction)

KOLOKOLOV, N.M., inzhener; SILIN, K.S., inzhener.

Experience making and using centrifuged tubular reinforced concrete elements in China. Bet. i zhel.-bet. no.7:249-253 Jl '56.(MLRA 9:9)
(China--Reinforced concrete)

SILIN, Konstantin Sergeyevich; KOLOKOLOV, Nikolay Mikhaylovich; ZELEVICH, P.M., inzhener, redaktor; BOBROVA, Ye.N., tekhnicheskiy redaktor

[Pile foundations for large bridges; experience in building a bridge across the Yangtze River in the Chinese People's Republic] Svainye fundamenty bol'shogo mosta; iz opyta stroitel'stva mosta cheres r. IAntszy v Kitaiskoi Narodnoi Respublike. Moskva, Gos.transp.zheldor. izd-vo, 1957. 43 p. (MLRA 10:9)
(Wuhan--Bridges--Foundations and piers)

SILIN, K.S., inzhener.

Prospects for utilizing newly designed caissonless footings. (MIRA 10:10)
Trans.stroi. 7 no.4:1-6 Ap '57.
(Concrete piling) (Bridge construction)

SILIN, K.S.; GLOTOV, N.M.; GRETSOV, A.P.; KARPINSKIY, V.I.; PROKHOROV, A.D.; YEVGRAFOV, G.K., prof., red.; ZELEVICH, P.M., inzh., red.; BOBROVA, Ye.N., tekhn.red.

[Precast reinforced concrete tube foundations] Fundamenty opor mostov iz sbornykh zhelezobetonnykh obolochek. Pod red. G.K. Evgrafova. Moskva, Gos. transp. zhel-dor. izd-vo, 1958. 198 p. (MIRA 12:2)

1. Deystvitel'nyy chlen Akademii stroitel'stva i arkhitektury SSSR (for Yevgrafov).
(Bridges--Foundations and piers)

SILIN, K.S., GLOTOV, N.M., starshiynauchnyy sotrudnik

Deeply laid foundations made of precast reinforced concrete shells. Transp.stroi. 9 no.1:18-25 Ja '59. (MIRA 12:2)

1. Rukovditel' otdeleniya iskusstvennykh sooruzheniy TSentral'nogo nauchno-issledovatel'skogo instituta stroitel'stva.
(Bridges--Foundations and piers)

SILIN, K.S., insh.; ZAVRIYEV, K.S., kand.tekhn.nauk; SHPIRO, G.S., kand.tekhn.nauk

Designing columnal shell foundations for working loads. Transp. stroi. 10 no.7:42-46 Jl '60. (MIRA 13:7)
(Bridges--Foundations and piers)

SILIN, K.S., inzh.

Further improvement of designs of precast shell foundations. Transp. stroi. 10 no.11:40-43 N '60. (MIRA 13:11)
(Bridges—Foundations and piers)

SILIN, K. S., Doc Tech Sci -- "Foundations of ~~transitional~~ made prefabricated reinforced concrete ~~support~~ casings of deeply embedded bridge ~~deep bay~~ piles." [Mos, 1961]. (Min of ~~Transport~~ Railways USSR. Mos Inst of Engineers of ~~the Railway~~ Railroad Transport im I. V. Stalin) (KL, 8-61, 240)

- 197 -
- ~~188~~ -

BEREZANTSEV, Vsevolod Glebovich, doktor tekhn. nauk, prof.; KSENOFONTOV, Aleksandr Ivanovich, kand. tekhn. nauk, dots.; PLATONOV, Yevgeniy Vladimirovich, prof.; SIDOROV, Nikolay Nikolayevich, kand. tekhn. nauk, dots.; YAROSHENKO, Vsevolod Aleksandrovich, kand. tekhn.nauk, dots.; GOL'DSHTEYN, M.N., doktor tekhn. nauk, prof., retsenzent; TERLETSKIY, V.P., inzh., retsenzent; LAPIDUS, L.S., inzh., retsenzent; ZHEREBTSOV, I.V., inzh., retsenzent; GLOTOV, N.M., inzh., retsenzent; SILIN, K.S., inzh.,retsenzent; SURODEYEV, V.P., inzh., red.; KHITROV, P.A., tekhn. red.

[Soil mechanics and foundation engineering] Mekhanika gruntov, osnovaniia i fundamenty. Moskva, Vses. izdatel'sko-poligr. ob"edinenie M-va putei soobshcheniia, 1961. 339 p. (MIRA 14:8)

(Soil mechanics) (Foundations)

SILIN, K.S.; GLOTOV, N.M., starshiy nauchnyy sotrudnik

Foundations of reinforced concrete shells. Avt. dor. 24 no.3:15-18 Mr '61. (MIRA 14:5)

1. Rukovoditel' otdela iskusstvennykh sooruzheniy Vsesoyuznogo nauchno-issledovatel'skogo instituta transportnogo stroitel'stva Mintrasstroya SSSR (for Silin).
(Bridges—Foundations and piers)
(Reinforced concrete construction)

SILIN, K.S.

Deep foundations made of precast reinforced concrete shells. (MIRA 15:7)
Osn., fund. i mekh. grun. 4 no.3:1-3 '62.
(Bridges--Foundations and piers)
(Precast concrete construction)

SILIN, K.S., inzh.; ZAVRIYEV, K.S., kand.tekhn.nauk

Method of making calculations for foundations with vertical pillars. Trudy TSNIIS no.45:34-55 '62. (MIRA 15:9)
(Bridges—Foundations and piers)

ZINGORENKO, G.I.; KRYL'TSOV, Ye.I.; SILIN, K.S.

Building foundations of piers for bridges made of precast reinforced concrete shells. Transp. stroi. 14 no.2:9-14 F '64. (MIRA 17:4)

1. Glavnyy inzh. Glavnogo upravleniya po stroitel'stvu mostov Ministerstva transportnogo stroitel'stva SSSR (for Zingorenko). 2. Nachal'nik Gosudarstvennogo proyektno-izyskatel'skogo instituta po izyskaniyam i proyektirovaniyu bol'shikh mostov Gosudarstvennogo proizvodstvennogo komiteta po transportnomu stroitel'stvu SSSR (for Kryl'tsov). 3. Rukovoditel' otdeleniya iskusstvennykh sooruzheniy Vsesoyuznogo nauchno-issledovatel'skogo instituta transportnogo stroitel'stva Ministerstva transportnogo stroitel'stva (for Silin).

S/081/62/000/024/013/052
B117/B186

AUTHOR: Silin, Łora

TITLE: Determination of free diphenylol propane during the condensation of epoxy resins

PERIODICAL: Referativnyy zhurnal. Khimiya, no. 24 (II), 1962, 826 - 827, abstract 24P22 (Polimery, tworzywa wielkocząsteczkowe, v. 6, no. 9, 1961, 284 - 288 [Pol.; summaries in Eng. and Russ.])

TEXT: A description is given of two methods (amperometric and colorimetric) for the quantitative determination of diphenylol propane (I) during condensation of epoxy resins. The amperometric method is based on the bromination of (I) with a bromide - bromate mixture in dimethyl formamide. Solutions of (I) of known concentration, and mixtures of (I) with epichlorohydrin and "Epidan-5" epoxy resin were titrated to explain the reproducibility of the results of amperometric titration. The determination is accurate to within 0.5 - 2 %. The minimum content of (I) determined by this method is 0.1 %. The color reaction with 4-aminoantipyrin previously used for phenol determination was applied for the colorimetric method. Five minutes after mixing the reagents, a stable coloring of the

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Determination of free ...

solution sets in which remains unchanged for 24 hrs. Epoxy resin and epichlorohydrin show no coloring. The content of (I) measurable by this method is $\leq$ 2 %. [Abstracter's note: Complete translation.]

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PROT, Tomasz; SILIN, Lora

Phosphonitrile chloride polymers. Polimery tworz wielk 9 no. 2: 37-40 F '64.

1. Institute of Plastics, Warsaw.

SILH,,Iona; KAJFASZ, Feliksa

Method of determining cyclohexanol in the presence of formaldehyde. Pt.1. Polimery tworz wielk 9 no.4:164-166 Ap '64

1. Institute of Plastics, Warsaw.

24-1-24/26

AUTHORS: Yerokhin, A.A., Kitaygorodskiy, Yu. I., Kogan, M. G., and Silin, L. L. (Moscow).

TITLE: On the effect of ultrasonics on the character of crystallisation inside a weld pool. (O vozdeystvii kolebaniy ul'trazvukovoy chastoty na kharakter kristallizatsii svarochnoy vanny).

PERIODICAL: Izvestiya Akademii Nauk, Otdeleniye Tekhnicheskikh Nauk, 1958, No.1, pp. 140-142 (USSR).

ABSTRACT: The results are described of some tests carried out by the Institute of Metallurgy, Ac.Sc. USSR (Institut Metallurgii AN SSSR) and the Scientific Research Technological Institute (Nauchno-Issledovatel'skiy Tekhnologicheskiy Institut) on the effects of ultrasonics on the character of crystallisation of the metal under welding conditions, paying particular attention to welding of scale resistant austenitic steels for which the problem of improving the structure is of particular interest in view of their pronounced tendency to trans-crystallisation. Typical welding equipment and standard welding regimes were used. Automatic welding was effected under flux, argon arc welding was effected by means of a tungsten electrode of 5 mm dia. using as

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On the effect of ultrasonics on the character of crystallisation inside a weld pool.

addition metal/4 mm wire of the alloy ЭИ-334. The oscillations in the metal were generated by means of a magnetostriction element which was rigidly connected to the transducer. The natural frequency of the mechanical system in the no-load state equalled 19.5 kc/sec, which varied as a function of the temperature of the metal, the dimensions of the bath and other factors, by 0.5 to 1.5 kc/sec when the bath was filled. The amplitude was about 35μ. Preliminary calculations showed that such an amplitude ensures a kinetic energy which is adequate for influencing effectively the crystallisation of the weld joint. The power consumed by the transducer is 2 to 2.5 kW. Two methods of generating the oscillations are compared; in one the oscillations were transmitted to the bath through the base metal (Fig.1a), whilst in the other the oscillations were produced in the weld pool itself by means of direct submersion of the tip of the oscillating element into the molten pool. The second mentioned method proved more favourable. The carried out experiments proved

Card 2/3 the possibility of utilisation of ultrasonics for

On the effect of ultrasonics on the character of crystallisation inside a weld pool.

controlling the processes of crystallisation of the metal of the seam during fusion welding.
There are 4 figures and 3 references - 1 Russian, 1 English, 1 German.

SUBMITTED: October 5, 1957.

AVAILABLE: Library of Congress.

Card 3/3

AUTHOR: Gulyayev, B.B. SOV/24-58-4-37/39

TITLE: Conference on Crystallisation of Metals (Soveshchaniye po kristallizatsii metallov)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1958, Nr 4, pp 153 - 155 (USSR)

ABSTRACT: This conference was held at the Institut mashinovedeniya AN SSSR (Institute of Mechanical Engineering of the Ac.Sc. USSR) on June 28-31, 1958. About 400 people participated and the participants included specialists in the fields of foundry, metallurgy, crystallography, physics, welding, heat, physical chemistry, mathematical physics and other related subjects. In addition to Soviet participants, foreign visitors included Professor D. Czikl (East Germany) and N.I. Chvorinov (Czechoslovakia). This conference on crystallisation of metals was the fourth conference relating to the general problem of the theory of foundry processes.

Crystallisation of Non-ferrous Metals. N.N. Belousov and I.A. Dodonov - in their paper "Investigation of the Crystallisation and the Properties of Non-ferrous Metals Under Conditions of Applying Pressure", presented results of experiments on producing castings which crystallise under pressure from all sides and piston pressure within a wide range of specific loads. The results of the investigation provide material for improving existing methods of applying pressure to influence the crystallisation of alloys. The influence of the conditions of crystallisation on the casting and mechanical properties of aluminium alloys, at normal and at elevated temperatures, were discussed in the papers of I.F. Kolobnev and A.Ye. Semenov. The results of investigations of the conditions of crystallisation of aluminium alloys during continuous casting were presented in the paper of Ye.D. Zakharov. N.L. Pokrovskiy and D.Ye. Ovsiyenko dealt with the features of crystallisation of various

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non-ferrous alloys and the physico-chemical phenomena accompanying this process.

Crystallisation of Metals in the Welding Bath. The following papers were read: B.A. Movchan - "Investigation of the Features of the Microscopic Chemical Non-uniformity in Alloys"; G.L. Petrov - "Crystallisation and Chemical Non-uniformity in Weld Joints"; M.Kh. Shorshorov and V.S. Sedykh - "Influence of Non-uniformities of Crystallisation in the Weld Bath on the Formation of Hot Cracks".

Crystallisation of Metals in an Ultrasonics Field. The following papers were read: Member of the Ac.Sc. Belorussian SSR N.N. Sirota, Ye.L. Lekhtblyed and B.N. Smolyarenko - "Crystallisation of Metals and Alloys in an Ultrasonics Field"; I.I. Teumin - "Influence of Elastic Oscillations on the Processes of Crystallisation and the technological properties of Alloys"; L.L. Silin and A.A. Yerokhin - "Effect of Ultrasonics on Crystallising Metal in the Weld Bath".

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SOV/24-58-8-14/37

AUTHORS: Kitaygorodskiy, Yu. I., Kogan, M. G., Kuznetsova, V. A., Rykalin, N. N. and Silin, L. L. (Moscow)

TITLE: Joining Metals in the Solid State by subjecting them to the Effects of Ultrasonics (Soyedineniye metallov v tverdom sostoyanii pri vozdeystvii ul'trazvukovykh kolebaniy)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, 1958, Nr 8, pp 88-90 (USSR)

ABSTRACT: During 1957 and 1958 methods of obtaining spot and seam joints of various metals under the effect of ultrasonics were tried out at the Institute of Metallurgy, Ac.Sc., USSR. It was established that the quality of the obtained joints depends on two groups of inter-related factors. The first group of factors depends on the physical properties of the metals (mainly hardness and ductility), the state of the surface (presence of oxide and adsorption films, height of micro non-uniformities) and the thickness of the joined components. The second group of factors depends on the regimes of the apparatus (oscillation amplitude of the tool, effect duration, the magnitude of the contact force), the geometry and the properties of the contact surface of

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Joining Metals in the Solid State by Subjecting them to the Effects of Ultrasonics

the used tool. By means of ultrasonics joints of various metals and alloys were produced, e.g. copper, aluminium, 0.1 to 1.5 mm thick duraluminium and 0.2 to 0.7 mm thick standard steels. The possibility of obtaining joints depends only on the thickness of that component which is located at the side of contact with the excitor of the ultrasonics; the thickness of the other component is of no consequence. Preliminary preparation of the joined surfaces usually consists of degreasing by means of solvents (e.g. methanol). The electric power consumed by the magnetostriction transducer is between the limits of 0.7 and 2.5 kW, the ultrasonics frequency is 18 to 25 kc/sec, the amplitude of the front face of the tool is 10 to 40μ. The duration of the effect of the ultrasonics in the case of a spot joint varied between 0.5 and 4.0 sec, the contact pressure being 10 to 100 kg, which is considerably less than the force required for cold welding by applying pressure. The optimum value of each of the parameters involved in the formation of a joint was determined by

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maintaining constant the values of the other parameters involved. For instance, using a contact end piece of 8 mm^2, the optimum values of the time of applying elastic oscillations and the contact pressure were 1.5 sec and 30 kg respectively for aluminium sheet. In Fig.1 the dependence on the duration of the ultrasonics and on the contact force is graphed of the shear strength of a spot joint of a 0.5 mm thick aluminium sheet. In shear tests of such joints, the failure occurred in the base metal and not in the joint. Reduction of the duration of the ultrasonics and reduction of the contact force bring about at first only a slight reduction in the strength without reducing the zone of the actual joint. However, further reduction of these values brings about a decrease in the joint area and consequently also a decrease in the shear strength. For instance, for an ultrasonics duration of 0.5 sec and a contact force of 10 kg, the failure will occur at the contact surface; under such a regime a joint will form only in individual insignificant sections of the area. An increase of the

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effect duration to 2 secs will also bring about a decrease in the strength. This is obviously associated with the longer duration of the ultrasonics which brings about an appreciable disruption of the surface layers, weakening the joints and tearing out the spot from the base metal. Tensile tests of good quality joints have shown that their strength is satisfactory, amounting to 30-35% of the shear strength. For usually applied contact forces, durations and amplitudes of the elastic oscillations, the relative deformation of the surface layers does not exceed 5%. A considerable deformation is observed only directly in the region of the joint. As an example, Fig.2 shows micro-photographs of the zones of joints of copper sheets for oscillation amplitudes of 50μ, a contact force of 50 kg and an application time of 1.6 sec; the reproduced micro-photographs show that in the zone of the joint the deformation of the metal is very complex. Usually two main types of joint structure are observed: a peculiar vortex structure (Fig.2, top) with a mutual penetration of both of the components to be

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jointed and sections with a continuous transition from one component to the other (Fig.2, centre). The thickness of the vortex structure zone reaches 0.4 mm and theoretically is located at sections of the initial contact of the components to be joined. The structure of the second type occupies the larger area of the joint extending to a thickness of 0.1 to 0.15 mm and represents a zone with an almost uniform fine grain structure, whereby in the individual sections which are located in the middle of the joint it was not possible to detect a crystalline structure of the metal even if large amplifications are used (Fig.2, bottom). Micro investigations of the joint zone does not reveal an appreciable thermal effect on the structure of the metals. Micro investigations of the joint after annealing for ten minutes at 600°C revealed differing grain sizes in the base metal and in the joint zone (Fig.3). There is reason to assume that the particles of surface oxides and of adsorbed films which penetrate into the metal prevent to a certain extent selective recrystallisation, which leads

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to the formation of a fine grain structure at the location of the joint. The method of joining metals in the solid state by means of ultrasonics is applicable not only to the here mentioned materials. At present investigations are being carried out relating to the conditions of formation of joints for a wider group of metals and alloys and the apparatus to be used for such work is being developed.
There are three figures.
(Note: This is a complete translation)

SUBMITTED: April 4, 1958

1. Metals--Bonding 2. Metals--Properties 3. Ultrasonic radiation--Performance 4. Ultrasonic radiation--Metallurgical effects 5 Ultrasonic projectors--Performance

12300 1573

27375
S/194/61/000/003/041/046
D201/D306

AUTHORS: Silin, L.L. and Yerokhin, A.A.

TITLE: The effect of ultrasonic waves on the crystallizing metal of a welding tank

PERIODICAL: Referativnyy zhurnal. Avtomatika i radioelektronika, no. 3, 1961, 20-21, abstract 3 E145 (V sb. Kristallizatsiya metallov, M., AN SSSR, 1960, 176-179)

TEXT: Two methods have been compared of exciting elastic oscillations in the metal of a welding tank: 1) by the intermediary of the basic metal and 2) directly in the liquid metal so as to obtain the required structure of the seam. The analysis is made using steel CT.3 (ST.3) 18 mm thick and 1 x 18 H9 (1 x 18 N9) 5 mm thick. A magneto-strictive head with a capacitor was used to obtain ultrasonic waves (frequency 19.5 Kc/s, power consumption up to 3 kw). The first method used shows that seams obtained with irradition have a tendency to form cracks. The method of introducing ultra-

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The effect of ultrasonic waves...

sonic waves into the liquid metal (the concentrator is placed together with the welding electrode and moves in synchronism with it) makes it possible to obtained good seam structure. [Abstracter's note: Complete translation]

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80976

S/180/60/000/03/006/030
E111/E352

18.7200

AUTHOR. Silin, L.L. (Moscow)

TITLE: Influence of an Ultrasonic Field on the Structure and Formation of Cracks in Weld-seam Metal in Arc Welding

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1960. Nr 3, pp 39 - 43 (USSR)

ABSTRACT: The author notes that little information on the use of ultrasonic vibration in welding is available. Work in which the present author participated (Ref 1) showed that ultrasonic vibrations could be transmitted to the bath through the base metal (apparatus shown in Figure 1) but macroscopic examination showed that with ultrasonic vibration the gradation of structure characteristic of ordinary beading remains but there are additional crystallisation cracks. To simplify analysis of the causes of changes in the seam metal, the author in the present work used a specimen of constant cross-section and of length equal to half the wavelength, this leading to the formation of a stationary wave. Beading welds were deposited with 4 mm diameter nichrome (77% Ni, 21% Cr) coated with UONI-13 NZh and NIAT-5 electrodes (25% Ni, 15%.Cr and 6% Mo). The welding

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Influence of an Ultrasonic Field on the Structure and Formation of Cracks in Weld-seam Metal in Arc Welding

procedure and distributions of vibration amplitude and elastic deformations are represented in Figure 2, while macrostructures obtained under various conditions are shown in Figure 3. The relation of equi-axial grain size to vibration amplitude is shown in Figure 4. It was found that the amplitude which eliminates the transcrystalline structure depends on metal composition. If a definite amplitude (depending on the physical properties of the liquid metal) is exceeded the weld deteriorates. Cracks are formed if the variable-sign elastic deformations in the base metal exceed the plasticity of the crystallization structure; the more disperse the structure the less the tendency. The author maintains the relations obtained form a basis for using the method of deposition on a test-piece containing a stationary ultrasonic wave as a test for evaluating the tendency of metal to hot cracking. There are 4 figures and 2 Soviet references.

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84611

S/135/60/000/004/008/008
A115/A029

1.2310 also 2708, 2208

AUTHOR: Silin, L.L., Engineer

TITLE: Scientific-Technical Conference on the Use of Ultrasonic Waves in Welding Processes

PERIODICAL: Svarochnoye proizvodstvo, 1960, No. 4, p. 42

TEXT: A meeting organized by the Welding Section of the Nauchno-tekhnicheskoye obshchestvo mashinostroitel'noy promyshlennosti in Moscow (Scientific Technical Society of Mechanical Engineering) was held in Moscow on December 9 - 10, 1959 to discuss problems of applying ultrasonic waves in welding metals and plastics. The Nauchno-issledovatel'skiy technologicheskiy institut (Yu.I. Kitaygorodskiy, G.V. Sysolin) (Scientific Research Institute of Technology) set up patterns of equipment for seam and spot welding; and a УЗСМ-2 (UZSM-2) device has been designed for seam welding of small-size work pieces. Work was going on upon UZSM-1 for contact welding and a portable apparatus УЗСА-3(UZSA-3) was under design for one-sided weldments. An announcement about a new scheme of producing shift stresses in the zone of joints with the help of ultrasonic torsion oscillation has been made by L.O. Makarov of the Institut akustiki akademii nauk SSSR

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84696

S/135/60/000/005/002/009
A115/A029

1.2300 2208, 2708 only

AUTHORS: Yerokhin, A.A., Candidate of Technical Sciences; Silin, L.L., Engineer

TITLE: Methods of Introducing Ultrasonic Vibration Into the Melting Pool

PERIODICAL: Svarochnoye proizvodstvo, 1960, No. 5, pp. 4 - 7

TEXT: It has been proved that ultrasonic vibration applied to crystallization of metals causes degasing of the melt and change of the mechanical properties. Low-frequency vibration raises the impact viscosity of the seam, whereby large-sized dendrites become small, diversely oriented crystals. If the amplitude of vibration is raised beyond a certain level, forming of a seam is prevented by splashing metal out of the melting pool. Ultrasonic vibration clears the way for raising the intensity of vibration, but there are still difficulties in transmitting intensified vibration to the melting pool; to get the necessary initial data, a series of tests was undertaken with aluminum bars weighing up to 1,000 g. The test reducing structure has been attained by direct contact of the vibrating surface with the melt (Fig. 1a). The force was lessened when vibration was applied only after a metal crust had been formed, i.e.,

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Methods of Introducing Ultrasonic Vibration Into the Melting Pool

30 sec after the metal filled the weld (Fig. 1b). Figure 1v shows macrostructures of a bar that has not been treated by ultrasonic waves. During uninterrupted action of ultrasonic waves, the crystallization of the surface does not set in immediately, but only about 10 - 20 sec after the weld had been filled in. The height of a metal bar exposed to the ultrasonic force is given by the amplitude of the force, and it has been proved that to each value of amplitude corresponds a certain size of the metal. The shape of the melting pool is of no importance (Fig. 3). Transmission of ultrasonic waves through welded metals is possible through contact of a thermostatic instrument with the melting pool, or by additional feeding wire to the pool. Transmission through the welded metal proved inefficient as only a portion of energy is utilized. The transmission through direct contact with the pool (Fig. 4) keeps the set rate during the process of welding. The tip of the emitter must be of heat-resisting material. Cooling the tip by water would adversely affect the quality of the seam by withdrawing heat (Fig. 5). Application of tungsten tips does not lengthen the life of the instrument. The most suitable way of transmitting ultrasonic waves has been found in the use of an additional wire (Fig. 7a, b). This method

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Methods of Introducing Ultrasonic Vibration Into the Melting Pool

allows for selection of components of the seam, besides being the most simple and universal. There are 8 references: 7 Soviet, 1 American.

ASSOCIATION: Institut metallurgii im. A.A. Baykova Akademii Nauk SSSR (Institute of Metallurgy im. A.A. Baykov of the AS USSR)

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86694

S/180/60/000/006/004/030
E021/E335

12310

AUTHORS: Balandin, G.F. and Silin, L.L.

TITLE: The Role of Friction During Ultrasonic Welding

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye tekhnicheskikh nauk, Metallurgiya i toplivo, 1960, No. 6, pp. 42 - 46

TEXT: An investigation of the distribution of the temperature in welded components in the process of ultrasonic welding has been carried out. Curve 1 of Fig. 1 shows the change of temperature (t, °C) with time (τ, sec) when plates of chromel and alumel of thickness 0.1 mm were joined. Curve 2 in Fig. 1 shows the change in the strength (Q_{av}, kg) of the joint with time. The maximum temperature occurred at the time when the strength of the compound had become constant. Zero strength did not coincide with the time of the beginning of the increase in temperature. The results can be explained in terms of friction. The increase in temperature is caused by heat generated by the relative movement of the two components. When a joint is made, there is no relative movement and the

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The Role of Friction During Ultrasonic Welding

temperature drops. The strength of the joint does not increase from the moment when the temperature increases because the surface films (oxides, etc.) on the components must first be destroyed. Fig. 2 shows the temperature change at the point of contact between the tip of the ultrasonic instrument and the higher component (Curve 1) and at the contact between the two components (Curve 2). It can be seen that a joint is first established between the tip of the instrument and the top component. The characters of the two joints are different because the tip of the instrument is very hard and the two components are relatively plastic materials. Fig. 3 is a microphotograph of a joint between two copper plates and shows the region where intensive plastic deformation has taken place. Fig. 4 shows the distribution of temperature in the top and lower components during welding. There is a high temperature gradient at the surface of contact between the two components. More heat is generated directly below the ultrasonic

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The Role of Friction during Ultrasonic Welding

instrument because the relative movement of the two components is greatest at this point.
There are 4 figures and 7 references: 3 Soviet and 4 non-Soviet.

SUBMITTED: June 18, 1960

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AUTHORS: Silin, L.L., Kuznetsov, V.A., Engineers, El'yasheva, M.A., Candidate of Technical Sciences

TITLE: The Strength of Weld Joints in Aluminum Alloys Produced by Ultrasonic Welding Process

PERIODICAL: Svarochnoye proizvodstvo, 1960, No. 7, pp. 5-8

TEXT: Information is given on results of investigations into the strength of weld joints produced by ultrasonic welding and subjected to static and vibration loads and to the effect of temperature. Specimens made of 0.8 mm thick "AMr3M" (AMg3M) and 1.2 mm thick "Д16М" (D16M) alloys were subjected to shearing and breaking tests at 20, 100, 150, 200 and 250°C. The specimens consisted of two plates joined by overlap welding on a laboratory installation equipped with a "УЗГ-10" (UZG-10) generator and a "ПСМ-7" (PSM-7) transformer. A conic steel tool with a removable spheric "ШХ15" (ShKh15) steel tip was used. The dimensions of the tool provided for a triple augmentation of the oscillation amplitude during the transmission from the transformer to the work piece. The amplitude was measured by a contactless vibrometer. The welding time was controlled by the "ПВ-52"

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The Strength of Weld Joints in Aluminum Alloys Produced by Ultrasonic Welding Process

(PV-52) electric chronoscope. The frequency of oscillations remained constant during all the experiments; it was checked by a "3Г-11" (ZG-11) sound generator and a "30-" (EO-7) cathode oscillograph. Welding parameters are given in a table. Specimens for comparative tests were welded on a standard spot welding machine using the conventional technology. A comparison of results leads to the following conclusions: The static strength of joints in D16M and AMg3M alloys produced by ultrasonic welding and subjected to shearing and breaking tests at room and higher temperatures is not below the strength of joints obtained by resistance welding. A raise of the temperature to 150°C reduces the strength to 20-25%; and to 40-45% at 250°C. The fatigue limit of overlap joints produced by ultrasonic welding is similar to that of analogous joints obtained by contact welding. Vibration strength of ultrasonic weld joints is extremely high and approaches that of the base metal. It is by 30% higher than the vibration strength of resistance-welded joints. In static tests the stability of strength of ultrasonic welds is lower than that of resistance weld joints. The dispersion

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AUTHORS Silin, L.L., Nikolayev, A.V., Engineers Klebanov, G.N., Candidate of Technical Sciences, Kuznetsov, V.A., Engineer

TITLE New Welding and Cutting Methods

PERIODICAL Svarochnoye proizvodstvo, 1960, No. 12, pp. 34-37

TEXT: New welding and cutting methods exhibited in a show include ultrasonic welding, plasma processing, welding with an electron beam in a vacuum, cold pressure welding and diffusion welding in a vacuum. The authors report on a series of new machines for the aforementioned purposes. The UZSM-1 ultrasonic apparatus is intended for spot welding of small-size thin alloy parts or their connection with plates. The unit consists of a welding head, a device producing the static force, a time relay and an electric control system. A ПМС -15 (PMS-15) type magnetostriction transformer is used to excite ultrasonic mechanical oscillations in the welding head. The static force is developed by a pneumatic diaphragm device. The force is controlled by modifying the air pressure on the diaphragm with a pressure regulator equipped with a control manometer. The air supply to the diaphragm and its outlet are achieved by an electromagnetic-driven

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New Welding and Cutting Methods

pneumatic distributor. The apparatus can be operated individually or automatically. Oscillations may be switched-off after each spot. Spot welding of cermet contacts with bronze bridges was demonstrated on the described machine using a special device (Figure 1). The ultrasonic УЗСМ-2 (UZSM-2) apparatus for seam welding of metal was exhibited together with a technological device for welding annular diaphragms and membranes of 50-110 mm in diameter. On the seam welding device a magnetostriction transformer rotates together with a welding roller and a massive supporting roller. The rollers are connected by a transmission gear. The static force is produced by means of a foot lever. The ultrasonic portable УЗСА-3 (UZSA-3) machine is intended for one-sided welding of thin sheet parts in structures with large plane or shaped surfaces excluding the use of stationary machines. The apparatus consists of a welding head, a vacuum device and an electrical control system, and its design provides for a transmission without considerable losses of electric power from a generator at a distance of up to 50 m. This is one of the advantages of the ultrasonic welding method. The УЗТШ-1 (UZTSh-1) ultrasonic welding machine can be used for spot or seam welding by exchanging the acoustic unit. The contact force is produced by pneumatic drive. In all the described devices the oscillations are transmitted by pressing the part to the lateral surface in the antinode of the longitudinally oscillating

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Instrument. In the ultrasonic assembly-welding table of the МС 20.019 (I020.019) type, the oscillations are transmitted to the work from a vertical rod fixed perpendicularly to the longitudinally oscillating link of the magnetostriction transformer. This machine is used for spot welding of parts, one of which must be not over 0.1 mm thick. Ultrasonic welding of plastics is made on the УЗП -1 (UZP-1) and the ПУТ -5а (PUT-5a) machines which can be used for spot and pitch-seam welding of 0.5-10 mm thick thermo-plastics and polymers. Welding with a plasma jet of low-carbon, low-alloy and high alloy steels and alloys was demonstrated with the use of a head fixed to a ГС -17МУ (GS-17MU) welding machine (Figure 6). Argon is used as an operating and carbon dioxide as a shielding gas. The plasma jet and the arc are concurrent. Filler wire, introduced into the plasma jet is used to fill the gap. The current varies within 30-450 amp. A plasma jet is also used in building-up and cutting of metals. Welding with an electron beam is coming into industrial use. This process can be performed on the ЭЛУ 1 (ELU-1) unit (Figure 7) intended for welding straight seams up to 1,000 mm long and annular seams at a speed of 2-50 m/hr. The machine consists of the following basic parts: a vacuum chamber, an electron gun, a mechanism displacing the work to be welded, a vacuum system, a feed source and a control unit. The electron-beam gun ensures a 1.5 kw maximum power of the beam at a

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maximum acceleration voltage as high as 22 kv. The diameter of the beam can be varied within 0.6 - 4 mm by an electrostatic and magnetic focusing system. The gun can be vertically displaced by 45 mm and the beam can be deflected in the plane perpendicularly to its direction, by 10 mm. A three-phase voltage rectifier is used as a feed source (380/22000 v). The limit vacuum in the chamber attains $5 \cdot 10^{-5}$ mm Hg. The vacuum system consists of a forevacuum pump and a vacuum unit of 4,500 l/sec capacity. Friction welding is performed on the MCT -34 (MST 34) machine designed by VNIIESO for friction butt-welding of cylindrical rods 15-30 mm in diameter. A 15 kw motor drive is used, the rotation speed of the spindle is regulated within 500-1,000 rpm. The parts to be welded are clamped with the use of chucks. Efficiency is up to 150 welds per hour. Cold pressure welding equipment includes the MCXC -35 (MSKhS-35) (Figure 8) and the MCXC -5 (MSKhS-5) machines. The former is used for butt welding copper (up to 150 mm^2 section) and aluminum conductors up to 300 mm^2 section. Hydraulic pressure is used and the maximum force is 35 tons. The MSKhS-5 machine is intended for welding aluminum and copper conductors of 2-20 mm^2 section. Pneumatic drive is used and the upsetting force is 5 tons. The efficiency of the machine is 60 welds per hour. The CHC -2 (SNS-2) table stand is used for welding 5 - 25 mm^2 section

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aluminum conductors and 4 - 10 mm^2 section copper conductors, the KC-6 (KS-6) tongs are also intended for welding aluminum and copper conductors and the PC-7 (PS-7) for welding aluminum and copper wire. A unit for diffusion welding in a vacuum (CBAY-3 - SVDU-3) consists of a high-frequency tube generator operating within a range of 300 - 450 cycles, a vacuum chamber and a hydrocylinder. The required rarefaction is obtained using a diffusion pump. The parts are heated with a copper inductor made of a square tube with 1 mm thick walls. The heating temperature is controlled by a platinum-rhodium thermocouple. Twelve parts can be simultaneously welded in the chamber. The unit can be employed for welding cast-iron with steel, cermet plates to cutting tool holders, etc. Arc welding of pipes rotating in a magnetic field, welding in water vapor, and high-frequency welding of plastic films were also demonstrated.

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New Welding and Cutting Methods

Technical characteristics of machines for ultrasonic welding of metals and plastics

Characteristics	Type of Unit						
	UZSM-1	UZSM-2	UZSA-3	UZTSh-1	I020.019	FUT-5a	UZP-1
Power of the magnetic-striction ultrasonic transformer in kw	2,5-4,0	2,5-4,0	1,0	4,0	0,5	4,0	4,0
Operating frequency in k cycles	19,5	19,5	22	20	14-19	20	20
Regulation limits of the contact force in kg	20-200	20-140	5-20	10-200	2-40	5-250	5-400
Limits of welding time regulation in sec	0,1-4,0	-	-	0,2-8	0,2-5,7	0,2-8,0	0,2-8,0
Welding speed	-	4,5-150 m/hr	-	4,5-145 m/hr	-	up to 100 spots/min	6-30 spots/min

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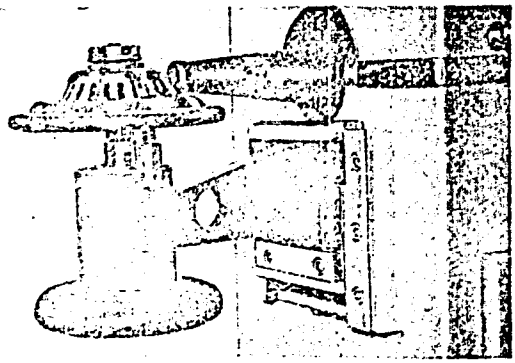

Figure 1.

Ultrasonic welding-on of cermet contacts

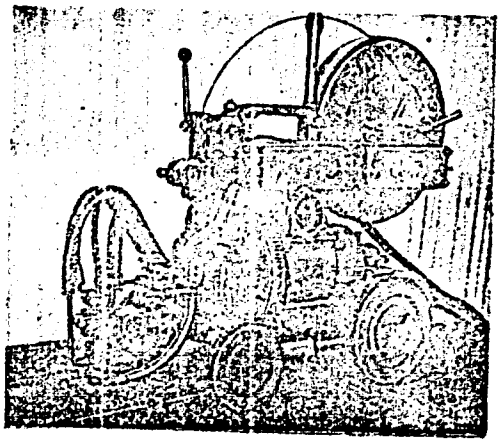

Figure 6.

The TS-17MU welding tractor converted to welding with a plasma jet

SILIN, L. L., CAND TECH SCI, "BONDING OF METALS AND IMPROVEMENT OF THE QUALITY OF WELD SEAMS by means of ULTRASONICS." MOSCOW, 1961. (ACAD SCI USSR. INST OF METALLURGY IM A.A. BAYKOV). (KL, 2-61, 212).

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AUTHORS Amfiteatrova, T.A., Balandin, G.F., Kodolov, V.D. and Silin, L.L. (Moscow)

TITLE The breaking-up of grains of solidifying metal under the action of ultrasonic vibrations

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Metallurgiya i toplivo, no. 6, 1961, 79 - 87

TEXT: The action of ultrasonic vibrations on the solidification of aluminium in steel moulds of 50 mm in diameter was investigated by metallographic examination of the castings produced at the Laboratoriya teorii svarochnykh protsessov Instituta metallurgii imeni A.A. Baykova (Laboratory of the Theory of Welding Processes of the Institute of Metallurgy im. A.A. Baykov). Ultrasonic vibrations were produced by means of a magnetostrictive generator, the end face of which oscillated with a frequency of 20 kc/s and an amplitude of 32 μ; the power input was 2.0 to 2.5 kW. The diameter of the contact face was 22 mm and the ingot-mould diameter was 50 mm. The first

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The breaking-up of grains ....

experiments were carried out by decanting the liquid metal remaining after different lengths of time. Metallographic examination of longitudinal sections showed that solidification took place from the periphery inwards. The structure immediately adjacent to the walls was not destroyed by the ultrasonic vibrations and was still columnar. The remainder of the casting was fine-grained. It is proposed that the fine grain size is due to nucleation by solid fragments broken from the columnar zone under the action of ultrasonic vibrations. Further experiments showed that the columnar peripheral zone was not present when metal was poured into a mould preliminarily heated to 700 °C. In this case solidification begins only from the contact with the ultrasonic instrument. The solid metal so formed is broken up by the vibrations and causes grain refinement of the casting. The next experiments were carried out by heating the aluminium to 740 - 750 °C and allowing solidification in the crucible in air (cooling rate about 0.5 °C/sec). From the moment when solidification temperature was reached, vibrations were introduced into the melt for different lengths of time

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AUTHORS: Balandin, G. F., Silin, L. L., Candidate of Technical Sciences

TITLE: Means of stabilizing conditions of ultrasonic welding of metals

PERIODICAL: Svarochnoye proizvodstvo, no. 12, 1961, 1-6

TEXT: There is as yet no established theory on the mechanism of ultrasonic welding. Previous investigations in this field have shown that the quality of the joint depends mainly on the degree of heating the parts to be welded at the spot of contact and that thermal cycles obtained under different welding conditions can be divided into the following 4 types: 1) the temperature raises to a maximum and then decreases monotonously; 2) during welding, the temperature changes more smoothly and remains constant or increases slightly after the maximum has been attained; 3) temperature raises rapidly until a certain point and then remains almost constant; 4) monotonous temperature increase until thermal saturation at a low rate. Considering the kinetics in the formation of welds the authors studied the aforementioned types of cycle and their combinations, and investigated changes in the oscillation amplitudes, and the structure of joints. It was found that ultrasonic welded joints can be

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Means of stabilizing conditions ...

produced within a wide temperature range, and that its highest value at the contact spot of the parts is entirely determined by oscillation amplitudes and the contact force. A great part is played by the oscillation amplitude of the instrument. It was found that slight changes in the conditions of transmitting the oscillations to the parts produce weld joints whose structure and quality are sharply different.(Fig. 7). The strength of the joints depends considerably on the hardness and the material of the welding tip. Some recommendations are given for the purpose of raising the quality and strength of joints. To reduce losses in ultrasonic energy, it is suggested that tips be used assuring maximum friction factors with the material welded. The surface and geometry of the tool should be maintained constant. A parameter of ultrasonic welding, which makes it possible to control the quality of joints, should be determined. This parameter would possibly be the acoustic power, passing through the parts, or the oscillation amplitude transmitted to the support (Author's Certificate no. 127471 with priority from January 7th, 1960). Oscillation amplitudes should be stabilized and the capacity of ultrasonic equipment should be raised. There are 8 figures and 10 references: 6 Soviet-bloc and 4 non-Soviet-bloc. The reference to the most recent English-language publication reads as follows: Balmoff, W., Thomas, J., Meyer, F. Ultrasonic welding of dissimilar metal combinations

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PHASE I BOOK EXPLOITATION SOV/6020

Silin, Lev Leonidovich, Gennadiy Fedorovich Balandin, and Moisey Grigor'yevich Kogan

Ul'trazvukovaya svarka; soyedineniye metallov v tverdom sostoyanii i uluchsheniye kachestva svarnykh shvov (Ultrasonic Welding; Joining Metals in a Solid State and Improvement of the Weld Quality) Moscow, Mashgiz, 1962. 251 p. 11,000 copies printed.

Ed. (Title page): N. N. Rykalin; Reviewers: K. K. Khrenov, Corresponding Member, Academy of Sciences of the USSR, and P. K. Oshchepkov, Doctor of Technical Sciences; Ed.: O. V. Chernyak; Tech. Ed.: B. I. Model'; Managing Ed. for Literature on the Hot Working of Metals: S. Ya. Golovin, Engineer.

PURPOSE: This book is intended for technical personnel of plants, scientific research institutes, and planning organizations.

COVERAGE: The book is the first Soviet monograph devoted to the application of ultrasound to welding processes. Part I, written by L. L. Silin, discusses the question of joining metals in a solid state; Part II, by G. F. Balandin, the

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effect of ultrasound on the crystallizing metal; and Part III, by M. G. Kogan, the methods of generation of ultrasonic vibration in parts. Particular attention is given to the technology of ultrasonic welding and to the utilization of elastic oscillations for improvement of the weld metal quality. Problems of the calculation and design of generators of ultrasonic vibration are reviewed. No personalities are mentioned. There are 167 references, mostly Soviet.

TABLE OF CONTENTS:

ACC NR: AP6033023 (A) SOURCE CODE: UR/0135/66/000/010/0006/0009

AUTHOR: Kuznetsov, V. A. (Engineer); Silin, L. L. (Candidate of technical sciences)

ORG: Institute of Metallurgy im. A. A. Baykov (Institut metallurgii)

TITLE: Automatic quality control of ultrasonic welds

SOURCE: Svarochnoye proizvodstvo, no. 10, 1966, 6-9

TOPIC TAGS: ultrasonic welding, automatic quality control, ~~welding~~ quality control, ~~weld~~ weld evaluation, vibration analysis, shear strength

ABSTRACT: Two methods of automatic quality control of ultrasonic welds have been developed. In the first method, the weld quality is evaluated from the amplitude of vibrations transferred to an anvil. At the predetermined optimal level of vibrations, the shear strength of the welds was found to vary within not more than ±5%. In the second method, the weld quality is evaluated from the depth of depressions made by the welding tool. The scatter of the strength values usually does not exceed ±8%. Prototypes of equipment for both methods of automatic qulaity control of ultrasonic welds have been designed. Orig. art. has: 6 figures and 1 table.

SUB CODE: 13/ SUBM DATE: none/ ORIG REF: 009/ OTH REF: 002

UDC: 621.791.052.08:620.179.16

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RUTNER, Ya.F., inzh., SILIN, M.L., inzh.; TRAKHTENBERG, B.F., kand.tekhn.nauk

Simulation of temperature fields in axisymmetric sectional dies for drop forging. Vest.mashinostr. 43 no.11:53-55 N 63. (MIRA 17:2)

LUTSEVICH, P.A.; MONGALEV, G.F.; MIKHALEVICH, N.G.; ZINOVICH, K.F.; SAFRONENKO, A.P.; KLIMENKOV, P.A.; GAYDUKEVICH, N.M.; SILIN, M.S.; BRAZOVSKIY, P.V.; KOVPAK, M.D.; MELESHKEVICH, O.A.; KAMENTSEVA, V.N.; KULIKOVSKIY, A.V.; TARAYKOVICH, P.I.; ALEYNIKOV, G.A.; SHMULEVICH, Sh.S.; GRACHEVA, K.I.; NIKOLAYEVA, Yu.N.; VOLOKHOV, M.A.; DOMASHEVICH, O., red.; KARKLINA, E., red.; ZUYKOVA, V., tekhn. red.

[Manual for livestock raisers] Spravochnik zhivotnovoda. 2., dop. i perer. izd. Minsk, Gos.izd-vo sel'khoz.lit-ry BSSR, 1963. 462 p. (MIRA 16:8)

1. Glavnyy zootekhnik Upravleniya nauki Ministerstva sel'skogo khozyaystva Belorusskoy SSR (for Safronenko).
(Stock and stockbreeding)

SOLIN, N., inzh., MOSIN, N., inzh.

Modernization of electric circuits turning and changing the speed of the KP-5-25 crane. Rech. transp. 24 no.7:20-21 '65. (MIRA 18:8)

1. Murmanskiy rechnoy port.

SOV/124-58-10-11316

Translation from Referativnyy zhurnal, Mekhanika, 1958, Nr 10, p 89 (USSR)

AUTHOR Silin, N.A.

TITLE Determination of the Parameters of Water Transfer With the Aid of a Venturi Tube (Opredeleniye parametrov gidrotransportirovaniya s pomoshch'yu truby Venturi)

PERIODICAL Tr. Kiyevsk. gidromelior. in-ta, 1956, Nr 6, pp 143-157

ABSTRACT Bibliographic entry

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