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## ABSTRACTS OF PUBLISHED ARTICLES

UDC 620.178.7

**Structural stress relaxation in steel of 12X18H10T grade near the caverns of highrate penetration.** Barakhtin B. K., Savenkov G. G. – Problems of Materials Science, 2001, N 4(28), p. 5–9.

Structural changes in a high-strength material of a target under the action of a plastic pellet with a rate of 2,5 km/s are investigated.

*Key words:* high-strength material, target, hollow charge, structure distortion.

UDC 620.186:681.3.06

**Computer program for multifractal analysis of pictures of metals and alloys.** Barakhtin B. K., Chashnikov V. F. – Problems of Materials Science, 2001, N 4(28), p. 10–13.

It has been developed a computer program for the performance of multifractal analysis of pictures of structures. This program is intended for optimization of structural-mechanical state of materials.

*Key words:* structural-mechanical state of materials, multifractal analysis, computer program.

UDC 678.5:534.28

**The influence of aliphatic modifiers upon the vibration-absorbing properties of epoxypolimers.** Nesteruk P. J., Myasnikova M. P. – Problems of Materials Science, 2001, N 4(28), p. 14–17.

The results of investigation of vibration-absorbing properties of polymers based on modified epoxide ЭД20 and the influence of modifiers upon the vibration-absorbing properties of synthesized polymers are presented

It is established a dependence of the maximum mechanical losses angle and the temperature of maximum mechanical losses on the composition and structure of the initial components.

It is shown that it is possible to use home not-infrequent materials as raw materials for manufacturing vibration-absorbing materials.

*Key words:* modifiers, epoxypolimers, vibration absorption, internal friction.

UDC 669.15–194:621.039.536.2:539.55

**Prediction of  $J_R$ -curves for reactor vessel steels based on ductile fracture model.** Margolin B. Z., Kostylev V. I., Ilyin A. V., Minkin A. I. – Problems of Materials Science, 2001, N 4(28), p. 18–38.

A method of prediction of  $J_R$ -curves for reactor vessel steels is presented. The procedure of determination of ductile fracture model parameters based on testing of smooth and notched cylindrical specimens is proposed. The stress and strain fields near the tip of stationary and moving crack was investigated by FEM. A comparison between the predicted  $J_R$ -curves and experimental data obtained on 2T-CT specimens made of reactor vessel steel of 15H2NMFA-A grade in the initial and embrittled state has been performed.

*Key words:* reactor vessel steels, ductile fracture model,  $J_R$ -curves, experimental data, calculation of the stress-strain field.

UDC 621.791.052:620.196.2:621.039.536.4

**Calculation of the probability of fracture of austenitic piping  $D_{nom}300$  of the multiple forced circulation circuit of high-power boiling water reactor (HPBWR).**

M i r o s h n i c h e n k o A. I., P e t r o v V. A., T i m o f e e v B. T., C h e r n a e n k o T. A., K u l a z h e n k o v P. A., P e t r o v A. A. – Problems of Materials Science, 2001, N 4(28), p. 39–50.

Statistical assessment of parameters which determine pipe lines service life time is made on the basis of the analysis of the intergranular corrosion process in welded joints of austenitic piping  $D_{nom}300$  of the multiple forced circulation circuit of high-power boiling water reactor

Using a statistical testing method with certain assumptions taken into account it was determined a probability of a leakage and guillotine fracture of welded joints. The probability was calculated by two methods: a direct statistical modeling and modeling with the subsequent processing of the generated data. It was determined that the probability of guillotine fracture in the normal operating conditions was lower than  $10^{-7}$  a year<sup>-1</sup> and probability of leakage in a welded joint for 5 years of operation was  $3 \cdot 10^{-4}$ . Probability of leakage in one of 350 butt joints for the same period of time and with no repair was 0,1. In future the probabilistic assessment of fracture of piping  $D_{nom}300$  welded joints will be specified as the data on sensibilization mechanism of near weld metal and growth of intergranular corrosion cracks are accumulated.

*Key words:* NPP equipment, intergranular corrosion cracking, fracture probability, statistical methods.

UDC 621.791.042.5

**Stabilization of quality of welding flux-cored wire of 48III-8H grade.** B u g a i A. I., S h a m i n S. A., S h a r a p o v M. G.– Problems of Materials Science, 2001, N 4(28), p. 51–57.

Investigations were carried out to determine the optimum rate of 48III-8H flux-cored wire drawing. At this rate of drawing the fluctuations in the filling ratio were lowest and heterogeneity of the charge was the least. Hence the quality of wire was good and welding properties were stable.

*Key words:* welding flux-cored wire, drawing, filling ratio, density coefficient, rate of drawing.

UDC 621.791.753.5

**High-rate automatic submerged welding (review).** A n d r e e v S. V., G r i s c h e n k o L. V., S h e k i n S. I., Y a m s k o y M. V. – Problems of Materials Science, 2001, N 4(28), p. 57–61.

It's a literary review of some home and foreign investigations on high-rate automatic submerged welding. It is shown a principal possibility to increase the efficiency of automatic submerged welding due to the usage of the intensified welding conditions (high-rate welding at a maximum current intensity). Multiple-electrode welding with welding fluxes of a certain composition is the most effective. It is shown how the quantity and location of electrode wires, welding flux compositions and welding conditions reflect on weld formation. Approximate slag systems of fluxes and welding conditions which provide the formation of qualitative welds at high-rate welding are recommended.

*Key words:* automatic submerged welding, high-rate welding, multiple-electrode welding, formation of weld, efficiency, fused fluxes, sintered (ceramic) fluxes.

UDC 621.386.1:681.3.06:539.219.2

**Portable automatic X-ray device (apparatus) used for the control over the stress-strained condition of material of structures.** D r o z d o v a N. F., O b u k h o v s k y V. V., P h i l i p o v S. A. – Problems of Materials Science, 2001, N 4(28), p. 62–66.

It is described a developed portable automatic X-ray device with a software intended for the control over the stress-strained condition of structural materials: steels, titanium-, aluminium-based alloys.

The developed device was successfully used at investigations of fractures of structural steels for the determination of plastic strain zone at growth of a crack, at measurement of stresses in a specimen under a compressive load.

*Key words:* portable X-ray device, software, stress-strained condition, fields of application.

UDC 620.179.16

**About angle characteristics of scattering caused by acoustically soft disk in a solid body of plane monochromatic longitudinal and transverse SV- and SH-waves.** K r u g l o v B. A. – Problems of Materials Science, 2001, N 4(28), p. 66–77.

For more exact analysis of an acoustic route when ultrasonic inspection of metal structures is performed by a mirror echo-method we investigated the angle characteristics of scattering formed by acoustically soft disk in a solid body of plane monochromatic longitudinal and transverse SV- and SH-waves

*Key words:* ultrasonic inspection of metal structures, plane monochromatic longitudinal and transverse SV- and SH-waves, angle characteristics of scattering.