

Power Engineering

- Lubimov A. A.** Restorative thermal treatment of shell parts of turbines during complex turbine reconstruction after continuous service 3
Criteria described the feasibility of restorative thermal treatment, the preparations before, during the procedure, and the controlling and diagnostic operations after thermal treatment. The results obtained from subjecting shell parts of turbines to restorative thermal treatment in different modes under industrial conditions are analyzed by way of comparison and generalized.

Dynamics and Strength of Machines

- Nazarchuk Z. T., Skalsky V. R., Hirnyj S. I. and Rudavsky D. V.** Acoustic emission investigation of crack propagation in Cr-Mo-V steels of different degradation degrees 10
Acoustic emission investigation of 15X2MΦA and 15X2MΦA-A steel specimens for different degree of its degradation were performed. Typical peculiarities of change of acoustic emission signal parameters during quasi-static propagation of crack were found. Found parameters could be used in formation of new instrumentality for acoustic emission monitoring of reactor vessels of nuclear power plant.

- Romashov Yu. V.** Durability validation based on continual fracture mechanics for elements of power equipment constructions 15
This paper deals with durability validation based on continual fracture mechanics for elements of power equipment constructions. Approaches of durability indexes (g-percentile and mean life) validation subject to random spread of operating conditions are proposed. Generalized mathematical formulation and numerical solution by Galerkin–Bubnov method of continual fracture mechanics which is necessary for durability indexes validation are presented. Validation of durability indexes of steam boilers superheaters heat exchanger tubes subject to high-temperature creep and stress corrosion cracking is shown as illustration of proposed generalized approaches. It is established that mean life validation reduce to overestimate and g-percentile life is more overall estimate.

- Trohim G. R. and Stetzko I. G.** Integrity of information in the systems of vibrations analysis and reliability of its selection 21
An overview analysis of diagnostic systems of vibrations analysis is carried out. Attention is paid to the reliability and completeness of the signals produced by the primary transducers. The necessity of applying a design and software testing for multi-channel vibration measuring systems was suggested.

- Drobenko B. D., Budz S. F. and Astashkin V. I.** Refined calculation of the resource of the drum caldron with operational damages 25
The finite element simulation results of a stress state of the high pressure steam boiler drum subjected to exploitation conditions are considered. The elastic-plastic deformation and the real geometry of drum and material extractions in the drum after repair are accounted for. The accumulated damaging of the drum metal during stationary exploitation, planned start-and-stop, hydraulic test and emergency stop is determined on the basis of these results.

- Avramov K. V. and Borysiuk O. V.** Effect of parameters of journal bearings on self-vibration of one-disk rotor 31
Model of self-vibration of rotors with journal bearings is presented in this paper. Forces of oil film are presented as power series with respect to generalized displacements and velocities of rotor shaft. The coefficients of these power series are determined from finite element analysis. The impact of the gap between shaft and bearing on rotor dynamics is studied.

- Chernousenko O. Yu.** Determination of long durability and residual resource of rotors of turbine K-200-13038

Experimental and settlement research of long durability of metal rotor's steels 25X1M1ΦA steam turbines of power units by capacity 200 MWt, the 220 thousand which have fulfilled in actual practice more is conducted. It is races-even research it is based on the account of damaged according to not destroying control of the power equipment to experimental researches of long durability real rotor, which worked 275031 hours at total number of start-up 1182. The estimation of a residual resource of high-temperature elements of steam turbines by capacity 200 MWt is spent.

- Joldasbekov S. U. and Temirbekov Ye. S.** Calculation of structural collapse lever mechanisms taking into account the elastoplasticity44

In this paper a calculation of the destruction of the finite-element models of structural linkages. In statically indeterminate structures exhaustion of the bearing capacity of an element does not cause the destruction of the whole system, because the remaining elements form an unchanging system. Limit state of the assembly will be achieved only when the carrying capacity is depleted as many elements as required to ensure the geometric immutability. This idea is taken as the basis of calculation and is shown by the example of the excavator bucket. Elastoplasticity more fully utilizes the resources of structural strength and leads to savings in material

Applied Mathematics

- Bomba A. Ya. and Safonyk A. P.** Mathematical modeling of the magnetic cleaning liquids from multicomponent pollution49

In work questions of the accounting of return influence of characteristics of process (concentration of pollution of liquid and a deposit) on environment characteristics (factors of porosity, a filtration, diffusion) on an example of purification of liquid from multicomponent impurity in sorption filters are considered and solved. The algorithm of numerical and asymptotic approach of the solution of the corresponding modeling task which is described by system nonlinear singular the indignant differential equations of the convection-diffusion-mass exchange type is received. On this basis it is made the corresponding computer experiment.

- Ivanov K. S. And Jomartov A. A.** Justification design infinitely variable gear transmission56

The paper describes the rationale design of gear continuously variable transmission, which has the form of a closed differential gear with two degrees of freedom .. Developed equations of power relationships, kinematic and geometric parameters of the transmission in the kinematics and dynamics. The synthesis of gear continuously variable transmission with constant mesh wheels on the specified operating parameters of movement.

- Raisov Yu. A., Bychkov I. V. and Bychkov N. I.** Calculation the length of the B-spline curve ...65

This paper proposes a method for calculating the length of the B-spline curve. The method is based on the notion of B-spline curve in the form of a polynomial within each segment of the B-spline and using Simpson's formula (parabolas) for numerical integration. The technique is illustrated by an example.

Non-traditional Power Engineering

- Bannikov M. G.** Study of combustion characteristics of fatty acid methyl esters in diesel engine70

Based on a rigorous analysis of the fuel injection and in-cylinder pressure data the combustion characteristics of Jatropha Methyl Esters and their effect on diesel engine efficiency and emissions are investigated. The methods of the improvement of the engine efficiency with FAME are discussed.

- Kramskoy A. V., Kudryavtsev I. N. and Adamenko N. I.** Mathematical modeling of working cycle of perspective pneumatic engine77

The mathematical model has developed and computer simulation of working cycle has accomplished for piston pneumatic engine with a crank mechanism. As a result of optimization the basic power and operating characteristics have been obtained for the selected pneumatic engine design, which has a filling coefficient of PV diagram in the range 0,68–0,76.

Ecological Aspects in Mechanical Engineering

Ved' Ye. V. Modeling the kinetics of reaction of CO oxidation at the solid surface of the catalyst 85

In this article is considered a three-level process flow of the oxidation of carbon monoxide to carbon dioxide at the solid surface of the catalyst. The model of the description of the first level of the process - the conversion of carbon monoxide kinetics occurring on the surface of the catalyst was described.