

Power Engineering

- Veremeyenko I. S., Gladyshev S. V., Dedkov V. N., Agibalov E. S. and Sheludya-kov L. O.** Updating of energy-cavitation test rigs installed at the laboratory for hydraulic machines of IMEP of NASU.....3

There has been provided a description of hydrodynamic test rigs installed at the Laboratory for hydraulic machines of IMEP of NASU including their energy parameters and performance characteristics of measuring computer-base system developed. There has been described the process of updating of the test rig main equipment performed by Kharkovturboengineering Company (KhTE) in cooperation with the Laboratory for hydraulic machines of IMEP of NASU, which includes creation of a special plant intended for gravimetric proving of flow-meters and measuring computer-base system. These rigs make it possible to conduct composite energy-cavitation and acceptance tests of models of the hydraulic machines in compliance with the IEC 60193 requirements.

- Pereverzev D. A., Lebedev A. G., and Shelehina Zh. A.** Energy efficient of combined gas-turbine and steam-turbine units.....12

Methods have been developed and a large amount of research collaboration economy of gas turbine and steam turbine power plants in the form of an energy: high-temperature gas turbine superstructure (GTS) - steam turbine power unit with supercritical and supercritical initial parameters couple (GTS -STP). The results showed that the steam-turbine power unit with a power capacity of 300 MW or more, with the initial parameters of the pair 24–25 MPa and 540–550 °C, with GTS power 450–500 MW during the initial gas temperature of 1300 °C – net efficiency energy complex is 52–53%. When the initial temperature of gas in gas turbines up to 1500 °C, the efficiency will increase by 2%. In this GTS and supercritical steam parameters of the initial 30 MPa and 650 °C in the STP net efficiency can reach 56%, while increasing them to 40 MPa and 750 °C – 58% or more. By further improving the efficiency of power complexes of the net in the future when the initial gas temperature of 1500 °C can be reduced to 60%.

Aero- and Hydromechanics in Power Machines

- Tsakanyan O. S., Koshel S. V. and Tsakanyan S. O.** Increased heat output convectors by placing heat-exchange elements in a vertical exhaust duct.....25

The results of experimental studies convectors made on the basis of the wire heat exchangers placed in the exhaust duct. Investigated designs from one to four rows. It was found that the buildup of heat-exchange elements in a vertical row leads to a decrease in the relative heat transfer, and in the horizontal - to increase. With increasing pitch in the vertical sequence the effect of the thermal trace, thereby increasing the relative heat transfer up to 32%.

Dynamics and Strength of Machines

- Bozhko A. E.** On definition of displacements of masses of oscillating system with two degrees of freedom with singularisnal outer force.....32

This article presents the development of a new concept of transitional processes in electric circuits, which is offered by the author. The formulas of dynamical displacements of masses of oscillating system with two degrees of freedom with singularisnal outer force are received.

Applied Mathematics

- Yershov S. V., Derevyanko A. I. and Grizun M. N.** Newton method for implicit scheme of numerical integration of gasdynamic equations.....39

The iterative implicit scheme is constructed for unsteady Euler equations. Time derivatives of the governing equations are approximated by one-sided three-point differences, whereas spatial derivatives are approximated fully implicitly with a finite-volume approach, ENO-reconstruction and the Gounod's exact Riemann solver. The nonlinear system of the algebraic equations is solved by the Newton method. The implicit iterative scheme constructed here is devoid of errors of factorisation, linearisation and diagonalisation of implicit operator. Approximation and stability of the scheme are considered. To reduce unphysical numerical oscillations at large Courant numbers we suggest the scheme modification that uses choice of smooth stencil for time derivatives. The results of numerical experiment are presented.

Maksymenko-Sheyko K. V. and Sheyko T. I. Mathematical modelling of electromagnetic fields in fractal-type regular waveguides by R-functions method 48

The fractal geometry objects (like as Serpinsky carpet, Koch snowflake) began to be applied in a radio engineering at designing antenna devices and waveguides. The mathematical apparatus of the R-functions theory appeared rather convenient for the fractal geometry objects description. Thus the following constructive means are used: R-operations of system $\{R_0\}$; superpositions of function $\omega(x, y)$ with the periodic functions, allowing to translate the given function $\omega(x, y)$ along axes and along a circle; property of similarity of figures; recursive procedures. Problems of finding E-and H-waves in a regular waveguide with cross section as Koch snowflakes constructed on a regular triangle and a square are considered. Reliability of the received solutions was investigated with the help of majorizing areas method.

Chub I. A., Ivanilov A. S. and Novozhilova M. V. Decision of the project resources distribution problem as optimization problem of placement of geometrical objects with the variable metric characteristics 56

The mathematical model of a problem of the project limited resources distribution as optimization problem of placement of a final set of geometrical objects with the variable metric characteristics and spatial form is constructed. The decision method is offered and the numerical researches on an example of optimization of the performance plan of works on thermal networks reconstruction in Kharkov are considered.

Non-traditional Power Engineering

Levterov A. M., Marinin V. S. and Umerenkova K. R. Method for calculating thermal physical properties of alternative motor fuels 67

Environmental pollution with hydrocarbon fuel combustion products of industrial and vehicular power plants is discussed. To improve the efficiency of alternative motor fuels (AMF) being used as one method for solution the problem of environmental pollution, a unique method for calculating thermal physical properties of some types of AMF is proposed.

Materials Science in Mechanical Engineering

Mamaluy A., Fatyanova N., Shelest T. and Dulfan A. Influence of electrophysical processing expedients on the form stability of dispersionly aging alloys precision instrument engineering 72

The influence of a beam-processing and surface doping on structure, physical properties and stability of Cr-Ni-Al alloy is investigated. Were sets that all these methods of processing do not cause additional strain during long-lived exposure at the temperature of exploitation.

High Technologies in Mechanical Engineering

Stalinsky D. V., Scoromnyi A. L., Kasimov A. M. and Sinozacky A. M. The minimization of specific energy consumption on the processes of waste tires grinding and thermochemical destruction 75

The results of researches specific energy consumption on the processes of waste tires grinding and thermochemical destruction are presented. The statement and solving of the minimization of specific energy consumption on the processes of waste tires grinding and thermochemical destruction is given.

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