

Power Engineering

- Knabe A. G.** Method to increase economy and flexibility of sectional turbine casings to high steam conditions 3

Reasons of economy limitations of inner HPC (high-pressure cylinder) to calculated one and flexibility of outer HPC and IPC (intermediate-pressure cylinder) of turbines to high steam conditions are considered. Produced irregularity of temperatures in regimes close to nominal leads to rising of non-concentricity and steam leaking along the leakage of cutoff point cylinder. It is proved how using inverse formation of temperature irregularity of inner sectional casings of (HPC), it is possible to decrease leaking bringing clearances closer to calculated ones in the flowing part. And also to increase load rise rate at the expense of outer HPC and IPC.

Aero- and Hydromechanics in Power Machines

- Boiko A. V., Usaty A. P. and Avdyeyeva Ye. P.** Creation a methodology for evaluating the impact of blades exit edges cutting on the active type turbine cascades effectiveness 9

A technique for evaluation the impact of blades exit edges cutting on the active type turbine cascades effectiveness is presented. Described method was made with using of CFD-simulation and DOE theory

- Bykov Yu. A.** Numerical simulation of heat transfer of turbine blade cascade in viscous flow 16

The results of numerical simulation of heat transfer between gas flow and blade in turbine blade cascade in viscous gas flow with employment of $k-\omega$ u SST turbulence models are presented. The analysis of usability of turbulence models for prediction of local heat transfer characteristics of blades is performed using the numerical results obtained.

Heat Transfer in Engineering Constructions

- Khalatov A. A., Kovalenko A. S., Kuzmin A. V. and Lisovsky A. V.** The film cooling of the end wall of the nozzle apparatus 21

Results of experimental studies of film cooling of the end wall of the nozzle apparatus of the gas turbine are presented. The influence of secondary flows, operating and design parameters on the level of film cooling intensity is shown.

Dynamics and Strength of Machines

- Sklepus S. N.** Creep and damage of moderately thick shallow shells and plates from materials with characteristics depending from type of loading 28

The creep and creep-damage problems for moderately thick shallow shells from materials with characteristics depending on the type of loading are considered. The variational formulation of problem has been obtained in terms of refined theory of shells, which takes into account the transverse shear. The method of solving of non-linear initial-boundary creep and damage problems for shells with arbitrary forms based on the joint use of the Ritz, R-function and the Runge-Kutta-Merson methods. The examples of numerical calculations of the creep and creep-damage of plates and shells are presented.

- Getsov L. B., Katanaha N. A. and Popova I. P.** Techniques of desing definition of characteristics of creep at the first and second stage by results of relaxation tests with use of the restricted number isochrones curves of creep 35

Numerical methods of definition of characteristics of creep of materials according to relaxation tests of stress and a method of forecasting isochrones curves are developed at the various temperatures, based on reception of the equations of creep from available isochrones curves, inter (extra) polishing of speed of creep after temperature and representation of the gained dependences in the form of isochrones curves for the temperatures differing from experimental. It is established, that the activation energy of creep gained in calculations at same temperature range for different stress, can noticeably differ. The deviation inter (extra) polished values of speed of a creep strain from experimental does not exceed 40 % within the limits of a characteristic temperature span and stress for which the same mechanism of creep predominates.

- Yanchevskiy I. V.** Non-stationary oscillations of asymmetric disk bimorph in the direct piezoelectric mode42

The problem of non-stationary oscillations of the thin disk transducer due to metal-piezoceramic type is considered. The solution is plotted by applying Laplace integral transform in time and regularizing algorithm. The estimation of received results reliability is executed by means of numerically-analytical and finitely-element solutions comparison.

Applied Mathematics

- Avramov K. V., Tyshkovets O. V. and Maksymenko-Sheyko K. V.** Methods of R-functions and multiple scales in problems of nonlinear vibrations of circular plates with cut-outs.....50

The combination of R-functions and multiple scales is used to analyze nonlinear vibrations of circular plates with two cut-outs. The Rayleigh-Ritz method and R-functions are used to obtain eigenmodes of plate linear vibrations. Nonlinear vibrations are expanded by obtained eigenmodes. As a result, finite-degree-of-freedom dynamical system with small parameters is obtained. This system is analyzed by multiple scales method.

- Slesarenko A. P. and Safonov N. A.** Identification of unsteady nonlinear temperature dependence of power source of energy based on the variation-structural and projection method58

The inverse problem of unsteady nonlinear heat conduction is solved based on the joint application of the method of lines, iterative and variation-structural methods. The results of solving the inverse heat conduction problem are presented in the form of the identified parameters of the function that characterizes the power of the internal energy source of the temperature according to the computational experiment.

- Litvin O. M., Pasichnik V. O., Tkachenko O. V. and Chernyak O. O.** Optimization of mathematical models of aerodynamic surfaces for aeroengines on the base of B-splines.....63

Optimal choice method of number of horizontal and profile sections of aerodynamic detail surfaces of aeroengines which can be described unambiguously in cylindrical co-ordinates is being investigated. The method uses explicit expression for V-splines of 2-nd and 3-rd powers with unequal spacing of assemblies, in other words their presentation as explicit analytical forms on each of subintervals of a spline carrier.

Non-traditional Power Engineering

- Savitsky V. D. and Ternovaya L. V.** Methanol application as a fuel for internal combustion engines71

Fundamentals of developed conception of free-piston engine conversion to methanol feeding are stated. Results of comparative experimental researches of engine MEM3-245 operating on petrol and vaporized methanol are cited.