

**Power Engineering**

- Shubenko A. L., Babenko O. A., Goloshchapov V. N., Lykhvar N. V. and Kozlokov A. U.** Operation of T-100/120-130 cogeneration turboplant when heated network water in the heater upper stages .....4  
*In case of emergency or planned repair work a method of heating turbine T-100/120-130 network with one upper heater is provided. The results of computational modeling of thermal and electrical loads of units number 1 and number 2 PLC "Kharkov HPS-5" are presented.*

**Aero- and Hydromechanics in Power Machines**

- Grizun M. N. and Yershov S. V.** Numerical modeling of multidimensional gas flows with implicit iterative scheme .....10  
*The implicit iterative difference scheme, based on the Newton method, is built for multidimensional Navier-Stokes equations, which describe viscous gas flow. Explicit difference TVD and ENO schemes are used for approximation of spatial derivatives of flux terms, and backward difference formula approximates time-derivative. Multidimensional viscous gas flow in turbo-machine cascades is numerically modelled. Numerical efficiency of the implicit iterative scheme in comparison with Beam-Warming one is analyzed. Obtained results are compared with those of other authors.*

**Heat Transfer in Engineering Constructions**

- Maravilla Herrera C. and Yepifanov S. V.** Formulation of models to calculate the thermal boundary conditions in the channels of a turbine blade cooling system .....17  
*The task of formulating models to calculate the heat transfer coefficients and the temperature of the cooling air in the channels of a turbine blade cooling system is considered. Three models to calculate the heat transfer coefficients and three models to calculate the temperature of the cooling air are analyzed. The models are formulated so the heat transfer coefficients and the cooling air temperature are calculated using regression correlations; in which the engine gas path measured parameters are used as arguments. To analyze the model's robustness, 10 defects reflecting the change in the technical conditions of the engine gas path and its working conditions were considered. The best model to calculate the heat transfer coefficients and the temperature of the cooling air is selected based on the analysis of the obtained results.*

**Dynamics and Strength of Machines**

- Bozhko A. E. and Ivanova Z. A.** express-evaluation of the resonance frequencies of machine components by the method of oscillating frequency .....27  
*This paper presents a theory taking into account the resonance frequencies of the oscillations of mechanical systems, which are oscillatory systems with one degree of freedom using the oscillating frequency. Based on this theory, methods and devices developed rapid assessment of the resonant frequencies of mechanical systems and their method of vibration diagnostics.*
- Lvov I., Naumenko K. and Altenbach H.** Micro-macro analysis of creep and damage behavior of multi-pass welds .....31  
*Different zones of welded joints are subjected to different temperature fields during the process of welding. Furthermore, in multi-pass welding heating and cooling cycles, which occur due to the overlap of the pass beads, form complex microstructure. In this paper a method of evaluating creep response of the multi-pass weld based on the micro-macro mechanics approach is introduced. Multi-pass weld microstructure that consists from columnar, coarse-grained, and fine-grained zones is considered. Materials of these constituents assumed to be isotropic. Weld metal properties of inelastic behavior have general type of symmetry and are described by the anisotropic creep constitutive model. To model the microstructure of the multi-pass weld metal the representative volume elements (RVE's) with different number of passes are created and analyzed with FEA software ABAQUS. Numerical tests on uniform loading of the RVE's are performed. Creep material properties for equivalent weld material are found for welds with different number of passes.*

- Efimenko V. N., Kantor B. Ya., Rzhevskaya I. E. and Geleverya A. N.** Estimation of durability and dynamic characteristics of driving wheel of turbine pump ..... 39  
*The mathematical models and Computer Codes were developed for evaluation schemes taking into account the geometrical parameters, loading and boundary conditions for the water wheel of turbine pump of Fresisa. The stress-strain state and dynamics analysis for the water wheel of Kiev hydraulic accumulation station channels at operational state was accomplished*
- Gontarovskiy P. P., Protasova T. V., Glyadya A. A. and Pozhidayev A. V.** The estimation of thermostressed state of boiler drum TGME-464..... 44  
*The numerical estimation of thermostressed state of boiler drum TGME-464 is executed at start-up from cold, not cooled down and hot state and also at cooling. It is shown, that the drum durability is not limited by low-cycle fatigue.*
- Lynnyk O. V., Zelenskaya O. N., Kuznetsova M. G., Medvedovskaya T. F. and Medvedyeva K. L.** The experience in design and the method of calculation of the strength and dynamic characteristics of the bearing structures of reversible hydraulic machines..... 51  
*The method and Computer Codes for numerical simulation of dynamical stress-strain state and dynamics of bearing structures (covers) of reversible hydraulic machines operated in diapason of 70–600 meters. The results of numerical investigation of dynamical characteristics for cover of hydraulic machine for Hydraulic Accumulate Power Station of OJSC "Turboatom" production.*

*Applied Mathematics*

- Ilchenko B. S., Prischepo I. A., Ivasunyak I. S. and Inkulis V. V.** Normalization of gas balance calculation error in the gas transmission system ..... 57  
*Calculation error normalization notion for natural gas balance in gas transmission system has been examined. Feasibility of the gas balance calculation error normalization in conditions of incomplete and heterogeneous information on the sources of error and inaccuracy of initial data has been analyzed. The approach to the normalization, which is using the gas balance calculation error statistical model, was proposed.*
- Lytvyn O O., Shtepa N. I., Kulyk S. I., Chornaya O. S.** Mathematical minerals distributing model by means of spline-interlineation functions methods on a irregular located inclined boreholes system..... 61  
*The construction methods of three variables spline-interlineation functions formulae in the inclined boreholes system, placed both in the same plane and in an arbitrary way. The properties of the constructed mathematical models, as well as the prospects of their use for the exploration of mineral resources are explored. Description a method for constructing operators of three variables functions interlineation, which generalizes a well-known Zlamal method - functions of two variables approximation by the piecewise-polynomial (in particular, the piecewise-quadratic) functions on partitioning triangles.*

*Ecological Aspects in Mechanical Engineering*

- Kanilo P. M. and Sarapina M. V.** The analysis of power and ecological parameters of thermal power stations..... 68  
*Specific integrated parameters of ecological and chemical danger of power installations are considered at burning organic fuel. Results of complex research of the contents of cancerogenic substances are stated (switching and heavy metals) in smoke gases, sewage and ashes of power units of a coal thermal power station at use of black oil and gas illumination.*

**Vakulenko K. V. and Kazak I. B.** Performance multilayer coatings in different environments and under cyclic loading .....75

*Investigated the behavior of multilayer vacuum-plasma coatings deposited on steel 20Ch13, at sodium chloride solution with different pH, as well as in solutions of hydrochloric and sulfuric acids. Been tested in a corrosive environment under cyclic loading. The use of protective coatings leads to increased corrosion resistance in various aggressive environments in the 11 – 90 times and fatigue strength in the 1,2.*