MODELING NUMERICAL OF SELF-IGNITION ANEADS ISOOCTANE AND n-HEPTANE WITH AIR BEFORE THE FLAME FRONT IN PISTON SPARK-IGNITION ENGINES

A.P. Senachin, P.K. Senachin

The verification of the reduced mechanism of detailed chemical kinetics of mixtures of isooctane and n-heptane with air in a homogeneous reactor of constant volume and results of numerical simulation of the limits of self-ignition of the mixture before the flame front in the engine spark ignition in the phase plane of rotation speed - the firing angle by varying the degree of compression.

Keywords: *piston spark-ignition engines, homogeneous reactor, the flame front; self-ignition, knocking and detonation; detailed kinetics, modeling numerical.*

ANALYSIS OF THE CHARACTERISTICS OF DIESEL AT A CONSTANT POWER MODE

G.D. Matievsky, S.P. Kulmanakov

This article discusses the materials for the Exploration of the diesel engine at a constant power mode based on an analysis of the effective efficiency, which can be used for finding the most cost-effective modes of operation at frequencies lower than the nominal for a given level of constant power diesel engine.

Keywords: *diesel engine, constant power mode.*

APPLICATION OF FAME AIR THE USE OF RAPE OIL AS A FUEL FOR DIESEL ENGINES

S.P. Kulmanakov, A.V. Shashev, A.E. Svistula, G.D. Matievsky, S.S. Kulmanakov

The results of studies of the working process and toxicity of motor 13/14 using a specially designed system of joint air and rapeseed oil. A design nozzle joint fuel and air.

Keywords: *diesel engine, rape oil*, *fame air, fuel.*

IMPROVING WORKING PROCESS INDICATORS DIESEL ENGINE WITH SWIRL COMBUSTION CHAMBER

S.P. Kulmanakov, V.A. Kalinin, A.V. Shashev

This article discusses research materials workflow high-speed small-size diesel engine VAZ. Recommendations about perfection мощностных and economic indicators are developed.

Keywords: *diesel engine, working process indicators, swirl combustion chamber.*

THE METHODS OF HYDRODYNAMIC (FLUID-DYNAMIC) CALCULATION OF THE DUAL-FUEL FEED SYSTEM OF THE DIESEL ENGINE

M.I. Mysnic, A.E.Svistula

This article is about the methods of hydrodynamic (fluid-dynamic) calculation of the dual-fuel feed system of the diesel engine. The additional fuel is delivered to the high pressure line in the injector. The equations of fuel motion in the conduit (pipe line) of high pressure, boundary condition of the pump and injection are given in the article. The calculation method is made as the computer program.

Keywords: *diesel engine, double-fuel system, hydrodynamic (fluid-dynamic) calculation, equations, computer.*

EXTENSION OF THERMAL FRONT AT CAPILLARY MOISTENING OF POROUS MATERIALS

M.I. Nizovtsev, A.N. Sterlyagov, V.I. Terekhov

With application of method IR thermography studying thermal effect is lead at hit of a drop of water on a surface of a porous material in various heat and humidity conditions. Experimental data on movement of thermal front in the porous environment are received at capillary moistening, and also some results of an experimental research of movement of front of moist in a porous material are submitted.

Keywords: *heat and mass exchange, porous materials, thermal effect.*

TRANSLUCENT DESIGNS WITH CONTROLEDTHERMAL CHARACTERISTICS

M.I. Nizovtsev, V.I. Terekhov

Results of experimental and theoretical researches new translucent designs with controled thermal characteristics are presented. Dependences of thermal characteristics of windows with a thermal emission and ventilation of interglass layers, with use of screens and jalousie with heat-reflecting coverings from regime and

design data are considered. Limits of management by a heat transfer for the investigated window designs are specified.

Keywords: *translucent the designs, ventilated windows, windows with a thermal emission, screens and jalousie with heat-reflecting coverings, heat transfer.*

SURFACE TEMPERATURE OF BINARY SOLUTIONS DROPS DURING EVAPORATION

V.I. Terekhov, N.E. Shishkin

With the thermal imager surface temperature and drop size was studied during evaporation process in the air jet with temperature ranged t_0=20–100 ^oC. Experiences were spent for water mixtures of ethanol, methanol and acetone in all band of concentration change. During the time drop description studies is shown the shape linear decrease and temperature unevenness of the drops surface for the mixed concentration of water solution and research conditions.

Keywords: *heat and mass exchange, drops size during evaporation process,* evaporation of binary composition drops.

EXPERIMENTAL INVESTIGATION AND MATHEMATICAL MODELING OF AERODYNAMICS, HEAT AND MASS TRANSFER, RADIATION AND COMBUSTION OF CRUSHED FUEL IN A CIRCULATING FLUIDIZED BED

Vl.V. Salomatov, A.D. Rychkov, and Vas.V. Salomatov

Cold two-phase aerodynamics was simulated physically in a model boiler with circulating fluidized bed by the "Circofluid" scheme with use of laser optic-fiber diagnostics, tensometric converters, calibration units, and other measurement systems. Simultaneously, quasistationary operation of boiler CFB was simulated mathematically in the framework of 2D continuous model. Results of isothermal experiment were compared with calculations. In general, the comparison meets practical requirements. The mathematical model was also used for calculations of crushed fuel ignition and burn-out in the boiler with circulating fluidized bed.

Keywords: *circulating fluidized bed, two-phase aerodynamics, laser-fiber diagnostics, concentration, ignition.*

VALIDATES THE CHOICE OF CRITERIA DURING THE MATHEMATICAL PLANNING OF THE EXPERIMENT ADDING NON-SMOKY ADDITIVES IN DIESEL FUEL

V.V. Derkachev

The article validates the choice of criteria during the mathematical planning of the experiment adding non-smoky additives in diesel fuel.

Keywords: *diesel fuel, non-smoky additives, mathematical planning of the experiment.*

EXPERIMENTAL COMPLEX FOR CONTROL OF EFFECTIVE PROCESSES CLEANING EXHAUST GASES DIESEL ENGINES IN CATALYST CONVERTERS

A.L. Novoselov, V.V. Brazovsky, G.V. Medvedev, D.S. Pechennikova

An experimental complex is presented for control of effective processes cleaning exhaust gases diesel engines in devices with porous SVS-catalyst block filters. It allows comparative essessment of up to 216 variants of kitting of three-stage catalyst converters on the experimental device according to European standarts.

Keywords: *diesel engine, exhaust gases, control of effective processes cleaning, catalyst converters, experimental complex.*

METHOD OF THE RESEARCH OF QUALITY CLEAN EXHAUST GASES IN CATALYST CONVERTER DIESEL ENGINE

A.A. Melbert, V.V. Brazovsky, G.V. Medvedev

The method of the holographic registration of the condensed phase in the exhaust gases of the diesel engine is developed. The special feature of the method is that it uses a high-speed digital camera with the direct input in the computer processing of the results for the registration of a hologram. Cleaning processes in three-stage catalyst converter are studied.

Keywords: *diesel engine, exhaust gases, catalyst converter, holographic registration of the condensed phase.*

WORKING OUT OF TECHNOLOGY OF PYROLYSIS AND APPLICATION OF GAS GENERATORS AT RECYCLING OF THE WASTE

E.M. Puzyrev, V.G. Lury, V.A. Golubev, A.V. Laptov, M.E. Puzyrev

In work problems of working out of technology of recycling of a firm household waste by pyrolysis and gasification for the purpose of reception of generating gas for manufacture of thermal and electric energy at its burning in steam coppers and gas piston engines are considered.

Keywords: *a firm household waste, technologies of pyrolysis and gasification.*

USE MECHANICALLY ACTIVATED MICROGRINDING COALS IN POWER

A.P. Burdukov, V.I. Popov,
V.A. Faleyev, T.S. Yusupov

We have considered advantages of two trends in refining of coal as power-plant fuel, namely: deep demineralization and mechanoactivated grinding. It has been shown that both use of individual refining processes and their combination opens prospects for the increase of quality and energy content as well as decrease of activation energy, increase of their reaction capacity at the use of coal in power engineering.

We propose new technology for replacement of relatively expensive gas and mazut to micro-ground coals at ignition and stabilization of coal-dust flame combustion in power boilers as well as in the units of industrial heat and power engineering. The technology includes processes of micro-grinding, thermo-gas-treatment and mechanoactivation.

Keywords: *coal, power engineering, refining, mechanoactivation, micro-grinding.*

DETERIORATION OF INTERFACES OF COGWHEELS TRANSPORT CARS AND THE EQUIPMENT POWERS

A.V. Baranov, V.A. Wagner, C.B. Tarasevich, U.A. Baranova, A.N. Ponomareva

The model of oxidising wear process of sites of working surfaces of tooth gearings is resulted. Formulas for definition of speeds of wear process as a wide range of independent factors are received. The model opens possibility of the description of deterioration of interface as a whole and workings out of management methods by wear process.

Keywords: *equipment powers, transport cars, estimation of deterioration of interfaces of cogwheels.*

PROBLEM OF THE ESTIMATION OF TECHNOLOGY OF MULTICOMPONENT DIFFUSION HARDENING OF THE SURFACE OF DETAILS OF MASHINES AND THE TOOL FOR THE EQUIPMENT POWER MECHANICAL ENGINEERING

E.A. Kosheleva, S.G. Ivanov, E.A. Nesterenko,
M.A. Guriev, S.A. Zemliakov,
O.A. Vlasova, A.G. Ivanov

Researches of influence of saturated mixtures by chemicothermal treatment have shown, that combinations boron with titanium or chrome are increased tool service life and more economically in comparison with other ways. Optimum content of components in saturated mixtures by diffusion hardening by boron and chrome and by boron and titanium is established.It was made the research of the influence of chemical heterogeneity formed during crystallization of cast tool steels on the formation of diffusion layers. Diffusion layers were subjected to chemical and thermal treatment - borating at 950 °C during 4 hours. It was used the mixture on the basis of (B_4C) with the addition of activatior. The results of the research are presented in the paper.

Keywords: *chemical-thermal treatment, chemical-thermal cyclical treatment, borating, boron chrome plating, boron titanium plating, wear resistance, hardening, operational firmness of the tool.*

COMPLEX DIFFUSION HARDENING OF HARD LOADED DETAILS OF MASHINES AND THE TOOL

M. A. Guriev, S. G. Ivanov, E A. Kosheleva,
A. G. Ivanov, A. D. Greshilov, A. M. Guriev,
B. D. Ligdenov, G. A. Okolovich

Researches of influence of saturated mixtures by chemicothermal treatment have shown, that combinations boron with titanium or chrome are increased tool service life and more economically in comparison with other ways. Optimum content of components in saturated mixtures by diffusion hardening by boron and chrome and by boron and titanium is established.

Keywords: *chemical-thermal treatment, chemical-thermal cyclical treatment, borating, boron chrome plating, boron titanium plating, wear resistance, hardening, operational firmness of the tool.*

INCREASE OF OPERATIONAL CHARACTERISTICS OF FLUOROPOLYMER

SEALING CUFFS BY CREATION ON WORKING SURFACES POLYMER-POLYMERIC OF COVERINGS

V. E. Rogov, A. M. Guriev

The work describes the way of acquisition of polymer-polymer coverings on fluorine items of hermetizing significance. It is demonstrated that the given way allows to retain the elastic properties of the matrix considerably enhancing the resistability and solidity of the work surfaces of the fluorine items.

Keywords: *metal fluoropolymer materials, bearing, machine-building manufacture, wear-proof properties.*

METAL FLUOROPOLYMER MATERIALS FOR POWER MECHANICAL ENGINEERING: SPECIFIC FEATURES, WORKING OUT, MANUFACTURE, APPLICATION, THE DEVELOPMENT TREND

V.E. Rogov, A.M. Guriev,
S.O. Nikiforov, E.A. Kosheleva

The analysis was carried out and the main causes for the closing-down of the production of metal fluoropolymer materials were identifed. The review of patents for acquiring metal fluoropolymer bands was made and the promising elaborations enabling to enhance considerably the exploitation characteristics of the given materials were revealed.

Keywords: *metal fluoropolymer materials, bearing, machine-building manufacture, wear-proof properties.*

THE SOFTWARE OF TREATMENT AND ANALYSIS OF THE EXPERIMENTAL CURVES OF FLUIDITY ON THE EXAMPLE OF CARBONACEOUS STEELS

C.W. Karpov

It is shown the necessity of the preliminary treatment of the experimental curves of strengthening used in engineering calculations of technological processes of metals treatment by pressure. The methods of the preliminary treatment of the curves by the developed software in a form of two programs are described in the paper. The programming language is Delphi.

Keywords: *curves of fluidity, steel 45, elongation of curves, approximation, extrapolation, kinematic dependences, temperature dependences.*

RESEARCH OF PROCESSES OF COOLING OF THE HEAT-CARRIER AT FALTERING REGULATION OF HEATING

M.A. Mishin

Article is devoted questions of use of a method of faltering heating for residential buildings of mass building. The model describing processes of heating and cooling of the heat-carrier and air of premises is developed. The experimental data confirming adequacy of developed model are resulted. The data about time of the beginning of freezing of the heat-carrier in pipelines of various diameters is obtained.

Keywords: *diameter, residential building, freezing, heating, cooling, faltering heating, temperature, heat-carrier, pipeline.*

CREATION OF THE CLOSED WATER TURNAROUND SYSTEMS ON OBJECTS MOTOR TRANSPORTATION THE ENTERPRISES

A.V. Panasenko, E.V. Kondratiuk,
V.O. Buravlev, L.F. Komarova

In work working out of compact highly effective installation of clearing of petrocontaining sewage (on a car wash example) and results of experimental researches of overall performance of its separate modules is presented.

Keywords: *oil products, sewage, water turnaround systems, efficiency of clearing, the motor transportation enterprises.*

INFLUENCE OF PHASE TRANSITIONS ON THERMOPHYSICAL PROPERTIES OF DISPERSIBLE WOOD-MINERAL MATERIALS

A.N. Romanov, N.A. Romanova

Dependences of temperature are investigational on time of heating for stratified materials of containing as one of components crystallohydrates of mineral salts, testing the phase transition of the second family in the probed interval of temperatures. The presence of hysteresis, and also drop in the temperature of surface of standard, is experimentally set at his heating.

Keywords: *heat capacity, temperature, phase transition, crystallohydrate, wood-mineral material.*

ANALYSIS OF THE TIME SERIES OF OBSERVED BAIKAL AEROSOL

CHARACTERISTICS BY MEANS OF WAVELET TRANSFORM

A.E. Kaplinsky, O.G. Khutorova

Wavelet transform method was applied for analyzing the time dynamics of the number concentration of background aerosol particles in six size ranges. The start datasets were obtained in July 1991 during a continuous 120-hour experiment at the Baikal coast by means of a photoelectric particle counter. Preliminary data processing showed the presence of wave-like processes in the number concentration dynamics and qualitative correlation of these processes in various size ranges. Then the start datasets were subjected to a wavelet transform with the basis Morlet function. It was shown that for all size ranges the day variation of the concentration with the time scale 22–24 hours is the most significant. Besides, the processes with time scales about 4, 6, 12 and 14–16 hours are distinguished, probably connected with the mesoscale atmospheric fluctuations.

Keywords: *Time dynamics, settlement concentration of particles, the size of particles, background an aerosol, experiment, wavelet transformation*

STRETCH RATE OF FLAME

V. V. Zamashchikov

In work the generalized parity for definition of deformation of a flame is received. Special cases when the flame possesses spherical, cylindrical symmetry are considered and is an infinite surface. The received parities coincide with the equations resulted in the literature for special cases.

Keywords: *a flame, normal speed of a flame, a curvature of front of burning, flame deformation.*

EXPERIMENTAL COMPLEX AND PROGRAM FOR STUDIES DYNAMICS DEVELOPMENT AND STRUCTURE FUEL STREAM

A.V. Eskov, V.I. Iordan, S.I. Gibelgauz

The article description experimental complex and program for studies dynamics development and structure diesel torch.

Keywords: *diesel engine, diesel torch, fuel stream, experimental complex.*

DETERMINATION OF THE OPTIMAL MAXIMUM TEMPERATURE OF THE BODY STIRLING ENGINE, DISPOSE OF HEAT EXHAUST GAS RECIPROCATING ENGINES

D.D. Matievsky, V.A. Romanov,
V.S. Kukis, A.I. Rybalko

The article presents the results of determining the optimal maximum temperature of the working body Stirling engine, designed to recover heat from exhaust gases from reciprocating internal combustion engine. It is shown that to maximize the work, the temperature should be about 700 K

Keywords: *Stirling the engine, a piston internal combustion engine, exhaust gases, warmth recycling.*

THE FOUR-CYCLE ENGINE WITH THE WINDOW IN THE CYLINDER SLEEVE

L.M. Jmoudiak, A.L. Zhmudyak

In article are described work and advantages of the offered and patented piston engine, the basic which constructive difference consists that in the four-cycle engine there is constantly open window in a sleeve, for this reason there was a working name «the engine with a window in a sleeve – the MASTIFF». In the offered engine release of gases is carried out both through final valves and through constantly open window in a cylinder sleeve.

Keywords: *piston internal combustion engine, window in a sleeve of the cylinder, double release of the fulfilled gases, increase of capacity and EFFICIENCY.*

NUMERICAL RESEARCH OF ENGINE WITH THE WINDOW IN THE CYLINDER SLEEVE

L.M. Jmoudiak, A.L. Zhmudyak

In the previous article authors have stated principles of work and gave reason for advantages four-cycle engine with a window in a sleeve the MASTIFF. In the present article results of settlement research the MASTIFF on the basis of tractor diesel engines are resulted.

Keywords: *a piston internal combustion engine, a window in a sleeve of the cylinder, double release of the fulfilled gases, increase of capacity and EFFICIENCY, numerical research.*

NUMERICAL RESEARCH OF ENGINE WITH THE WINDOW IN THE CYLINDER SLEEVE AT HIGH ROTATIONAL SPEED

L.M. Jmoudiak, A.L. Zhmudyak

The article describes the four-stroke piston internal combustion engine with the window in the cylinder sleeve. A mathematical model of that engine and a computer program for its simulation have been created. Calculations on the model showed the following. Because the gas from the cylinder goes out through the valves and through the ports the exhaust is easy. Therefore, at the higher engine speed the efficiency is increases. At high rotational speed (average speed of the piston is 21 m/c) efficiency increases by 11%.

Keywords: *the piston diesel engine, window in a sleeve of the cylinder, double release of gases, high average speed of the piston, increase of capacity and EFFICIENCY.*

ABOUT THE OPPORTUNITY OF RESULTS USE OF THE STATIC PURGE BY AIR OF GAS EXCHANGE SYSTEM ELEMENTS AT MATHEMATICAL MODELLING DOUBLE RELEASE OF THE ENGINE WITH A WINDOW IN A SLEEVE

A.A. Balashov, A.E. Svistula, S.V. Jakovlev

The analysis of legitimacy of use of a static purge by air of basic elements of air-gas pathes for mathematical model of the engine with a window in a sleeve is executed

Keywords: *the engine, the engine with a window in a sleeve, a static purge, gas exchange, mathematical modelling, double release of combustion products.*

THE ADJUSTED TECHNIQUE OF RESULTS PROCESSING OF THE STATIC PURGE AIR OF GAS EXCHANGE SYSTEMS ELEMENTS OF ENGINES WITH EXHAUST GASES DOUBLE RELEASE

A.A. Balashov, A.E. Svistula, S.V. Jakovlev

The adjusted technique of results processing of a statistical purge by air of flowing gas exchange systems of the engine with a window in a sleeve with the fluid dynamics losses account in an adiabatic flow is submitted.

Keywords: *the engine, a static purge, system of gas exchange, a technique of results processing.*

SELF-PROPAGATING HIGH-TEMPERATURE SYNTHESIS AND PROPERTIES OF OXIDE TITANIUM BRONZES

M.K. Kotvanova, S.S. Pavlova, I.E. Stas

This work reports the preparation of potassium, rubidium and cesium titanium bronzes by a method of self-propagating high-temperature synthesis. The studying of the chemical properties of oxide bronzes points out their high stability in aggressive environment. The electrochemical properties of oxide bronzes were studied using a carbon-paste electroactive electrode. It was shown that on the surface of the carbon-paste electrode both titanium (III) and titanium (IV) atoms present.

Keywords: *self-extending high-temperature synthesis, oxide titanium bronzes, chemical and elektro-chemical properties.*

ELECTROCHEMICAL BEHAVIOR AND THE STRUCTURE OF OXIDE MOLYBDENUM AND TUNGSTEN BRONZES

M.K. Kotvanova, S.S. Pavlova, I.E. Stas

Oxide bronzes H_xMoO_3 ($x \leq 0,30$), Na_xWO_3 ($x<0,50$), K_xWO_3 ($x<0,50$) were prepared by known and original methods. Their electrochemical properties were studied by a method of inversion voltamperometry. In this work, the correlation setting between electrochemical behavior of oxide bronzes of transition metals and their structures was observed. The analogy between the mechanisms of reduction of solid oxide bronzes, on the one hand, and iso- and geteropolyanions in aqueous solution, on the other, was found.

Keywords: *oxide molybdenum and tungsten bronzes, crystal structure, electrochemical behavior, the restoration mechanism.*