Abstracts
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Beata BIERNACKA
Semi-empirical formula for the natural ground temperature distribution in Bialystok City region

In this paper, temperature distributions measured in the ground since the start of 2000 to the end of 2006 are reported. The measurements were done in Bialystok City region for two differently covered ground surface locations. Temperature was measured with thermocouples distributed in the ground at a depth from 0 to 5 m (lawn) and from 0 to 9,5 m (car park). The semi-empirical formula presented in this paper, describes the temperature distributions in the undisturbed ground for Bialystok City region.

Aneta BOHOJŁO
Determination of thermal comfort factors in a habitable room

The purpose of this paper is to assess the thermal comfort in a habitable room via numerical analysis of an unsteady ventilation problem with ANSYS-CFX. Reynolds averaged Navier-Stokes equation (*RANS*) approach with k-ε *RNG* turbulence model was applied to obtain numerical results used to evaluate global (*PMV* – predicted mean vote and *PPD* – predicted percentage of dissatisfied) and local (*DR* – draught rating, *DRT* – dry resultant temperature *RH* – relative humidity) thermal comfort factors.

Jacek DAWIDOWICZ, Wojciech SIDOROWICZ
Neural modelling for calculating the heat transfer coefficient and required isolation layer of wall barier

The report presents the usage of artificial neural networks to calculate heat transfer coefficient *U* and the opposite model, which consists on calculating the thickness of the isolation layer with given coefficient. The methodology of making a set teaching artificial neural networks and the set of tested neural networks were described. The methods of artificial intelligence, including neural networks, let include in calculations many phenomena and processes hard to describe mathematically because of their nonlinearity, so obtained neural models will be completed by additional computable parameters in future.

Agnieszka JACHURA, Robert SEKRET
Streamlining of the energy management of building-installation systems on the example of the object
of the health service

Carrying the rational management on is one of basic challenges of contemporary world with energy. Therefore, they more and more often start paying attention for raising using the effectiveness of energy and the height of using the unconventional sources of energy.
Offices, objects of the Health Service, schools and offices are absorbing the entire energy used in Poland over the 6%. Growing costs of the exploitation of buildings and the possibility of applying for funding thermomodernization action partially, are inducing for carrying the modernization of objects of the public usefulness. Analysis of the technical state of buildings and internal installations is pointing at the considerable waste, but also for using the energy by the huge potential of the frugality which it is possible to free through the streamlining and updating systems, with simultaneous assuring appropriate exploitation conditions and preservations of the natural environment.
In the article an analysis of thermo-modernization variants of the hospital building – installation was described. Adapting the object of the hospital was a purpose of the modernization to new functional and technical standards, as well as to at present of applying regulations of the building code, conditions of technical and different special regulations.

Andrzej JEDLIKOWSKI, Maciej SKRZYCKI, Maciej BESLER
Influence of wick structures and working factors on heat pipe capacity

The paper includes theoretical explanations for the basic phenomena and process dealt with in heat recovery with use of heat pipes. The theoretical basics for thermosyphons and capillary heat pipes were described. The most commonly used capillary wick structures with work formula and were described. On the basis of charts work characteristics for different factors used in thermosyphons and capillary heat pipes were presented. The mathematical models for heat transfer in heat pipes were presented, model has been proposed on the basis of ε–NTU model.

Andrzej JEDLIKOWSKI, Maciej SKRZYCKI, Daria DENISIKHINA
Effect of surface cross-flow plate-fin heat exchangers on efficiency of heat recovery systems in the ventilation and air conditioning

Mathematical model of coupled heat and mass transfer in the plate–fin heat exchangers used in air conditioning systems for energy recovery from exhaust air is discussed. The original model has been proposed on the base of ε–NTU model. Numerical method for calculation of basic thermodynamical parameters has been developed. The carried out analysis shows a significant influence of finned surface on the processes of heat and mass transfer in the unit channel. The received results offer scope for estimation of optimal operating conditions range variations for plate–fin heat exchangers, used in air conditioning systems for energy recovery.

Zbigniew KARMOWSKI, Piotr RYNKOWSKI
An economical and technical analysis of heat pump usage for selected object

The economic-technical analysis usage of heat pumps in central heating and hot water systems for selected object are presented in the paper. The analysis was done for chosen variants of heat systems and was compared with chosen conventional systems of heat source. For each systems the capital and the operating cost was calculated. Moreover using Life Cycle Cost method (LCC) the value of LCC was calculated.

Piotr KĘSKIEWICZ
Shading/insulation system – construction, performance, profitability

Presentation of shading/insulation system, which is supposed to reduce losses (gains) of energy through transparent surfaces. Periodic increase of insulation properties of transparent surfaces during winter period (lower heat loss) and additional protection against excessive sun exposure during warm days (lower demand on cooling energy) which will generate savings. Construction possibilities and operating principles and were shows. Ways to control system, as well as benefits and potential uses. Discussion of economic balance including usage of system, deferent sources of heat energy, theoretical money gains, and potential increase in heat energy costs. The economic balance sheet for an example of theoretical storage depot. Simulation performed on popular computer program Purmo OZC version 4,0.

Dorota KRAWCZYK, Mateusz GOŁĄBIEWSKI
Technical and economical aspect of heating systems in public buildings on the base of selected samples from Podlasie Province

The problem of energy reducing relates to public buildings – services, shops and exhibition rooms. Proper heating system and higher grade work makes the installation more efficient and reduces the energy consumption. Besides, economic and technical analysis helps the investor to reduce the installation and operating costs. The paper shows different kinds of heating installations in buildings located in Białystok and the example of system evaluation.

Izabela MAŁECKA
Utilization efficiency of the hot water preparation system in thermal station

Nowadays, bigger and bigger emphasis is placed on the efficiency of the consumed energy and thus a charge reduction for heat supplies. Every new investment is to keep energy consumption on a reasonable level. One should remember about energy efficiency at the design phase. In the case of existing installations, one should look for such design solutions to reduce energy and heat losses

Aleksandra PRZYDRÓŻNA
The reduction of energy demand for air treatment and transport in ventilating plant with recirculation or heat recovery

The paper presents the possible energy reduction in processes of air treatment and its transport in ventilating plants due to the application of exhaust air recirculation or heat recovery from exhaust air. The obtained results are related to yearly work of ventilating plants for average external air parameters occurring in Wroclaw and to one-, two- and threeshift work of the devices. The received effects are presented for diverse minimal portions of external air in ventilating air and diverse temperature efficiency of heat recovery systems. The application of heat recovery exchangers in ventilation plants causes the increase of energy demand for air transport for even 40% in comparison to devices with open air flow or with air recirculation. The application of recirculation or heat recovery is especially effective when taking into account the thermal energy, the demand of which can be reduced even for ~ 95%.

Beata ŚNIECHOWSKA
Application of steam sootblowers and acoustic generator in power boilers

The adverse influence of contaminated surfaces on boiler's efficiency was described. The necessity of cleaning of heating surfaces in boilers was described. The paper presents the selected cleaning methods, with the application of steam soot blowers and acoustic generators in power boilers. The construction and rule of operation of cleaning devices were presented. Additionally various research was analysed and the best variant was introduced.

Michał TURSKI, Robert SEKRET
Buildings powered with the solar radiation energy

In this article systems of the air-conditioning of buildings with the solar energy utilization were described. There was also presented a demonstration system of the air-conditioning with using the solar driven adsorption chiller. Benefits coming from applying solar systems to the air-conditioning were shown. A standard structure of the adsorption chiller was presented. Energy problems in European Union countries were also considered.

Dariusz WAWRZYŃCZAK, Izabela MAJCHRZAK-KUCĘBA, Wojciech NOWAK
CO_2 separation research on selected sorbents by pressure swing adsorption

The paper presents the research results of applying selected commercial sorbents and synthesized from fly ash ones in adsorption method applying for carbon dioxide separation from flue gases emitted during coal burning, in oxygen-enriched atmosphere, as the one of the post-combustion CO_2 capture methods. The feed gas is a simulated flue gas mixture containing: CO_2, N_2, O_2 separated in two-bed pressure swing adsorption (PSA) installation. The process was carried out under different pressures and velocity of feed gas as well as different purge ratios. The results of average concentration of CO_2 in low-pressure product and average recovery of CO_2 from feed gas were presented for specific configuration of conducted process.

Anna WERNER-JUSZCZUK, Andrzej STEMPNIAK
Technical and economical analysis of the use of solid biomass as fuel

The technical and economic analysis of the use of three forms of solid biomass as fuel is the subject of this paper. Three technological schemes of boiler plants fired with wood chips, wood logs and pellets, are chosen, each of power 300 kW. The investment expenditures on building boiler plants the capital and operating costs were calculated. as well as the simple investment return period, which allows to compare the analyzed types of biomass with hard coal. There were the conclusions formulated, as follows: 1) The lowest capital and operating costs appear for boiler plant fired with wood chips, the highest for pellets. 2) It is profitable to replace hard coal with wood chips or wood logs. The simple investment return period for this types of biomass amount to 2 and 5 years. Operating cost for boiler plant fired with pellets is higher than for hard coal. 3) In relation to hard coal, the reduction of operating cost is possible by using wood chips or wood logs as fuel.