PROPOSAL

DEPARTMENT OF HEAT ENGINEERING AND EFFECTIVE ENERGY TECHNOLOGY

Head of the department :

Anton Ganzha,

Doctor of Engineering Sciences, Full Professor

E-mail: ganzha_371@ukr.net

We propose Bachelor and Magister degree courses in

Thermal Power Engineering

Our research priorities:

- thermal, hydraulic and optimization researches of different types surface heat exchangers, taking into account factors of their operation;
- thermal and hydraulic research of industrial processes;
- heat transportation, distribution and consumption in heating systems in order to improve their energy efficiency and reliability;
- heat transfer simulation in regenerative heat exchangers of different types high temperature thermo-technological installations;
- hydrogen energy conversion heat-recovery systems for heat and electric power production;
- heat transfer during drip and film cooling of high-temperature surfaces.

DEPARTMENT OF HEAT ENGINEERING AND EFFECTIVE ENERGY TECHNOLOGY

OUR RECENT PROJECTS

FUNDED BY THE MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

0115 U 000523. Development of energy efficient integrated heat recovery systems waste energy from high-temperature energy-technological processes

0113U000423. Power efficiency of waste heat systems for glass furnaces based on simulation and optimization of heat exchange equipment

0110U001235. Theoretical basic of efficiency of waste heat recovery systems based on high-temperature units using cogeneration technologies

SELECTED PUBLICATIONS

INDEXED IN SCOPUS

Migura A., Koshelnik A. Development and analysis of neural networks to predict the efficiency parameters of regenerator checker of glass furnace // Eastern European Journal of Enterprise Technologies. – 2015.

Koshelnik A.V. Modeling of thermal processes in the packing of regenerative heat exchangers in industrial glass-melting furnaces // Glass and Ceramics (English translation of Steklo i Keramika). – 2008.

Kuleshov V., Ganzha A., Shevchenko A. Influence of a fin temperature field on characteristics of capillary-suction heat exchanger-condenser // Heat Transfer Research. – 1999.

Possible future cooperation projects

STUDY OF WOOD PELLETS COMBUSTION IN THE RETORT OF BOILERS WITH AUTOMATIC FUEL FEED

The aim is to study of wood pellets combustion in boilers with capacity of 100 ... 2000 kW, especially:

- selecting of air feed scheme for the organization of uniform pellets combustion and retort walls cooling;
- studying of the temperature distribution along the layer height;
- determining the optimum layer thickness, gap size for air passage, and the retort metal thickness;
- elimination of overheating and coke pellets sintering which prevents the passage of air evenly through the entire layer.

To arrange a uniform combustion the boiler retort must be designed so that the fuel combustion rate is corresponds to retort geometrical dimensions, and coke sintering is precluded.

The study suggest improving science knowledge about pellet combustion in a layer with a bottom feed of air and fuel.

Possible future cooperation projects

SIMULATING OF PROCESSES IN COMPOUND BRANCHED SYSTEMS OF GENERATION, TRANSPORTATION AND CONSUMPTION OF HEAT IN ORDER TO INCREASE THEIR EFFICIENCY AND RELIABILITY

The complex of methods and tools, which allows to determine the efficiency and reliability of residential area heating systems on the basis of the system mathematical simulation of thermal and hydraulic processes. This helps to find reasonable variants of the modernization and reconstruction of the systems, which is an actual energy-saving task.

Using the developed methods and tools the hydraulic and thermal mode of heating network is simulated (also including it in emergency situations, for example, during network or booster pumps cutout), the probability of heat carrier boiling or overturning of circulation in some areas, and places with poor-quality heat supply are determined.

Possible future cooperation projects

STUDY OF MUTUAL INFLUENCE OF TECHNICAL AND OPERATIONAL CHARACTERISTICS OF COMPOUND HEAT POWER SYSTEMS EQUIPMENT AND RECONSTRUCTION OPTIONS ON THE SYSTEM EFFECTIVENESS

Integrated methods and tools for analysis and improving the efficiency of generation, transport and consumption of heat (for boiler-houses and combined heat and power plant, heat pipeline and substations, buildings and constructions), taking into account the technical characteristics of the objects and operational factors are developed.

As a result, the most rational variant of thermal power systems reconstruction can be determined; resources and cost overrun under the reconstructions can be reduced by taking into account the mutual influence the objects technical characteristics. It also can improve investment attractiveness of industrial and municipal power system.

Possible future cooperation projects

ANALYSIS AND DESIGN OF COMPOUND HEAT EXCHANGERS ACCORDING TO THE OPERATING FACTORS

An improved system is proposed for the analysis of compound heat exchangers. This makes it possible to improve the efficiency of surface heat exchangers by taking into account the distribution of local thermal and hydraulic parameters, which depend on the peculiarities of heat transfer, surface layout and operation factors.

By using these methods it's possible to decrease the fuel and energy consumption up to 50%, to reduce material capacity, and also to provide the required parameters of heat carriers for consumers and to reduce environment pollution.

Possible future cooperation projects

THE METHOD OF RAPID ASSESSMENT OF THE DISTRICT HEATING SYSTEM THERMAL STATE

The aim is to develop the method of experimental determination of heat losses in branched pipelines of district heating systems during their operation.

The practical implication can be the possibility of permanent monitoring of the level of district heating systems pipeline heat losses and identification of pipeline lengths with losses that exceed normative values.

Possible future cooperation projects

SIMULATION OF HEAT EXCHANGE IN SLOT CHANNELS OF PLATE EVAPORATOR

The aim of studying is:
- to investigate the influence of geometrical characteristics on boiling intensity;
- to optimize heat exchange surface of heat exchanger.

The study will improve science knowledge about plate heat exchangers-evaporators.

Possible future cooperation projects

SELECTION OF OPTIMAL CAPACITY OF HEATING PLANT POWER EQUIPMENT USING MATHEMATICAL SIMULATION

The project is concerning to studying heating plant with different capacity boilers at varying ambient parameters. As a result the heating plant efficiency can be increased and the fuel consumption can be reduced up to 5 %.