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ПОЛТАВА 2020

EXPERIENCE OF INTRODUCTION OF THE DISCIPLINE «HUMAN-MACHINE INTERACTION» INTO THE EDUCATIONAL PROCESS FOR PREPARATION OF BACHELORS FOR THE «SOFTWARE ENGINEERING» SPECIALTY

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MONITORING THE QUALITY OF INDOOR AIR IN AREAS OF HUMAN PRESENCE

According to the developed methodology for conducting the experiment and using electronic devices for measuring the content of carbon dioxide (CO₂) in the air and using a set of special laboratory facilities on the example of a school audience, the following was studied:

a) the variety of interactions between the external environment and the subsystem - classroom air;

b) activity of constituents of internal objects (present pupils, plants, adsorbing surfaces of elements of structures and interior) to allocate-absorb CO₂ depending on conditions and variation of action of dominant factors;

c) their manifestation and influence on the formation of the composition and content of the air mass, and therefore the internal microclimate of the training audience, the quality of which directly affects the health and efficiency of the attendees.

The study aims to monitor and evaluate the contribution in real terms [1], to find out the ratio of the volumes of each source of CO₂ emissions to the overall mass-gas manifestation, and to find innovative solutions to create adaptive systems for stabilizing and maintaining the microclimate in similar facilities.

The real objective idea about change of air mass of atmosphere in a closed room of a training audience depending on occupancy of class, nature of work, length of stay of pupils (during lesson, change, working day), working conditions, temperature, seasons, mode and efficiency is made applied ventilation.

Complex analysis of conformity of air composition in confined premises of educational institutions to the requirements of existing normative documents and efficiency of work of technical systems and means of their reproduction is carried out [2-4]. Through a psychophysiological study, his influence on the state of students' well-being was determined.

A model of the investigated thermodynamic system - air of a class room and the processes that occur in it under conditions adequate to real transformations and interactions [5-7] is developed. The approximations and assumptions are indicated; principles and features of planning and conducting empirical study of processes by static method;

use of materials and laboratory facilities; devices of measurement, control, regulation.

The contribution of CO₂ from plant life to the air of a closed audience is clarified: in the stages of photosynthesis and darkening; variation of their activity by changing the type of plants, their number, conditions of stay, the effective area of the photosynthetic surface, the applied lighting system (intensity, spectrum) [8-10], the ratio and duration of the phases of their stay.

The influence of CO₂ emission of additional present objects (porous adsorbing "active" and "passive" materials of elements of building structures and interior) on the composition and air quality of a separate room is revealed: depending on the degree of "closed" of the investigated subsystem of air in the room, its the volume, nature and direction of equilibrium displacement in the subsystem a) under isothermal conditions, b) in general nonequilibrium transformations.

The expediency of using artificial porous aluminosilicate adsorbing materials in the channels of inflow and recirculation air of adaptive systems of providing microclimate with variable air flow and periodic work, with cyclic thermal reverse (due to the manifestation of the recurrence and reproducibility of their adsorption properties, the ability of their adsorbability, energetically reversing the direction of transformations (even with the use of low-power means in renewable energy sources, ultra-high-frequency processing), which will provide reliability, stability of work and reproducibility of technical characteristics of the implemented systems.

The possibility of introducing activation of air purification methods using new photocatalytically layered perovskite-like oxide materials $M_2Ln_2Ti_3O_{10}$ (M - Li, Na, K; Ln - La, Nd) by soft chemistry methods has been discovered [11-15].

Objective ideas about the real processes of CO₂ mass manifestation in the objects of study are necessary prerequisites for formulating the technical specifications for the design and development of adaptive systems for maintaining the microclimate with the ability to regulate the ratio of inflow and recirculation air flows and adsorption and photocatalytic artificial radiation) using composite TiO₂-containing materials and their modifications.

The results reveal the ways of finding effective alternatives to existing engineering solutions.

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