ABSTRACT

Explanatory note size – 144 pages, contains 39 illustrations, 52 tables, 3 applications, 27 references.

Topicality. The relevance of the work is due to the fact that the available tools for conducting laboratory classes in high education institutions do not fully meet the needs of teachers and students. Traditional approaches often do not take into account the specifics of optimization problems and do not allow modeling conditions with a limited number of requests or their frequency, which is important for a deeper understanding of the topic. The situation is complicated by the presence of a large number of ready-made solutions on the Internet, which reduces students' motivation to independently search for answers, as well as the transition to distance learning, which limits the direct control of the teacher. In addition, the active use of artificial intelligence for automatic problem solving leads to a loss of educational value of practical work and requires new approaches to organizing the educational process.

The aim of the study. The main goal is to approximate the similarity of the conditions for performing laboratory work to real tasks when analyzing complex objects.

Object of research: The process of organizing and conducting laboratory classes using modern information technologies.

Subject of research: Methods, tools and software that implement support for laboratory classes using the «black box» method.

To achieve this goal, the **following tasks** were formulated:

– to analyze automated knowledge testing systems, types of analysis of complex objects and determine their advantages and disadvantages;

– to develop requirements for the functionality, architecture and interface of the web application;

– to develop our own software using modern technologies with the implementation of interaction with the system in the form of a black box;

– to check the quality of the developed solution.

The scientific novelty of the results of the master's dissertation is improving the

architecture of the software for conducting laboratory classes, through the implementation of the «black box» method and algorithms for the processes of performing computational tasks, which brings the analysis of a complex object closer to real conditions and requires students to pay attention to the effectiveness of the implementation of computational procedures and understanding their features.

The practical value of the obtained results is that the developed software creates conditions for conducting full-fledged research of a complex object using iterative methods, due to hiding the formalized description of the object and implementing a mechanism for multiple requests for modeling results.

Relationship with working with scientific programs, plans, topics. Work was performed at the Department of Informatics and Software Engineering of the National Technical University of Ukraine «Kyiv Polytechnic Institute. Igor Sikorsky».

Approbation. The scientific provisions of the dissertation were tested at the IX International Scientific and Practical Conference of Young Scientists and Students «Software Engineering and Advanced Information Technologies SoftTech-2025» – Kyiv.

Publications. The scientific provisions of the dissertation published in:

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