UDC 004.09

B. Kanivets[1]
V. Ruban[1]

USE OF CAS SYSTEMS IN THE DESIGN PROCESS

[1] National University «Yuri Kondratyuk Poltava Polytechnic»

Анотація

Досліджено провідні CAS системи, що використовуються в процесі розробки проектів. Визначено основні класи CAS систем та їх особливості. Проаналізовано бібліотеки програмних засобів, призначених для роботи з проектами. Доведено, що вимірювальні можливості системи нарощуються за рахунок пакетів їх розширення.

Ключові слова: CAS, системи комп'ютерної математики, проектування, проект, інформаційні технології.

Abstract

The leading CAS systems used in the process of project development were studied. The main classes of CAS systems and their features are defined. Libraries of software designed for working with projects were analyzed. It has been proven that the system's measuring capabilities are increased due to expansion packages.

Keywords:CAS, computer mathematics system, design, project, information technologies.

Introduction

Computer algebra system (CAS) have become the main tool of computer mathematics. Today, CAS are used to solve scientific, engineering, and educational problems, for visual presentation of data and calculated results, and also as convenient mathematical reference books.

The purpose of the work is to analyze the features of the leading CAS systems used in the process of project development.

Research results

Currently, seven classes can be distinguished among CAS: table processors; systems for numerous calculations; systems for analytical calculations; systems for statistical calculations; systems for special calculations; matrix systems; universal systems. The following are known world leaders among universal CAS: Derive, Maple, Mathcad, Mathematica, Matlab [1]. These systems have the following features: the combination of analytical and numerical methods is calculated; visualization of calculated results; application of high-level programming languages; exchange of information between themselves using various formats.

Despite the fact that each SCM has nuances in its architecture, it is possible to distinguish a typical structure of the class of modern universal systems. The core of the system, which forms the basis of CAS, is a representative set of basic functions and algorithms, so-called built-in functions. With the help of prepared programs, fast calculations of all functions of the kernel are carried out. Libraries are intended for computing rare procedures and functions. The computing capabilities of the system are increased through expansion packages. The user himself can write such packages in the CAS programming language, which allows to expand the range of tasks to be solved. The interface gives the user the opportunity to see the results of the decision on the display screen after accessing the system kernel. Any CAS includes a set of editors: text, formula, graphics, web support tools, HTML (XML) tools, animation and audio playback packages.

Systems of computer mathematics also solve tasks of graphic visualization of calculated results, including construction of various graphs. CAS graphics contribute to better understanding and assimilation of mathematical concepts. CAS is equally interesting for scientists and engineers, teachers and students of educational institutions, as well as for persons interested in mathematical calculations.

When solving specific practical tasks in the design process, as a rule, the construction and research of mathematical models is carried out, which can be attributed to one of the following types: analytical, simulation, combined, informational, structural-systemic, situational. The use of ICT tools expands the possibilities of mathematical modeling, turning it into computer mathematical modeling, which allows you to apply the modeling method in order to choose the most optimal way to solve the problem, taking into account the possibilities of computer science tools and methods.

The main method of building and researching models is the method of formalization, the essence of which consists in the principled separation of symbolic and meaningful (semantic) aspects of the studied object, in the possibility of formal transformation of signs and sign systems, and inverse transition from the constructed language model to the real one object, or building new objects on their basis. At the same time, computerization significantly expands the field of application of the formalization method, which allows creating a space for the implementation of a mathematical model, thus initiating the expansion of the field of application of the mathematical modeling method.

The effectiveness of any activity depends on the extent to which the components of its actions meet the requirements of completeness and are based on fundamental knowledge. The most important components of traditional mathematical culture are understanding the variable capabilities of various tools for implementing any methods of solving applied mathematical problems. At the same time, both exact and approximate methods are used. In the process of choosing the necessary application software, it is necessary to determine the main tasks that need to be solved and choose the special package that is more effective.

Conclusions

It has been established that new technologies are being implemented, namely computer algebra systems that improve existing tools and help in the process of working on projects. Today, computer algebra systems are an indispensable tool in developing projects, studying and performing mathematical problems.

REFERENCES

1. Systems of computer algebra. What happens when math software is really easy to use? URL: https://www.maplesoft.com/ns/maple/cas/computer-algebra-systems-math-education.aspx

2. Computer Algebra Systems URL: https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=af4e734000049636da354e5f3b7bfe0a81e69669

3. Maple - The Essential Tool for Mathematics - Maplesoft [Electronic resource] URL: http://www.maplesoft.com/products/Maple/index.aspx.

4. GeoGebra | Free Math Apps - used by over 100 Million Students & Teachers Worldwide [Electronic resource] / GeoGebra.URL : http://www.geogebra.org.

Рубан Володимир Дмитрович — аспірант, Національний університет "Полтавська політехніка імені Юрія Кондратюка, м.Полтава, e-mail: V_RUBAN2020@gmail.com

Канівець Богдан Валерійович — аспірант, Національний університет "Полтавська політехніка імені Юрія Кондратюка, м.Полтава, e-mail: bogdan.kanivets.99@gmail.com

Ruban Volodymyr D.— graduate student, National University «Yuri Kondratyuk Poltava Polytechnic», Poltava, e-mail: V_RUBAN2020@gmail.com

Kanivets Bogdan V.— graduate student, Poltava Polytechnic National University named after Yury Kondratyuk, Poltava, e-mail: bogdan.kanivets.99@gmail.com