

MATHCAD IN SCIENTIFIC RESEARCH AND ENGINEERING

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Анотація

У статті розглянуто Mathcad як програмний продукт для застосування в різних галузях освіти, науки і техніки. Проаналізовано переваги Mathcad у математичному програмуванні, інтеграції з CAD та CAE, інженерних розрахунках. Запропоновано використання Mathcad як корисного інструменту в математиці, розрахунках та аналізах, документації та науковій графіці.

Ключові слова: Mathcad, програмне забезпечення, дані, рівняння, змінна, пошук, ітераційні обчислення, математично-орієнтований інтерфейс.

Abstract

The article considers Mathcad as a software set for application in various fields of education, science and engineering. The advantages of Mathcad in mathematical programing, integration with CAD and CAE, engineering calculations are analyzed. The use of Mathcad as a useful tool in mathematical solution and analysis, documentation and scientific graphics is suggested.

Keywords: MathCAD, software, data, equations, variable, retrieval, iterative calculations, mathematical-oriented interface.

Introduction

MathCAD is a powerful and universal environment for solving problems in various fields of science and technology, finance and economics, physics and astronomy, mathematics and statistics, scientific research and education.

Mathcad is a software set that is specially made for presenting equations and mathematical models. It is helpful in many industries to show a range of data related to work processes, development and research. [1]

The capabilities of Mathcad are used for managing and communication purposes and mathematical programing in science and engineering. Some of the features of Mathcad include the ability to render graphs and charts in two dimensions. The software also allows for laying out algebraic equations with variables and describing their use. For example, a user can take two variables like “time” and “speed” and draft them on a plotted set of axes, while displaying equation work above. Proponents of the software promote it as a much more sophisticated alternative to trying to use a spreadsheet or other basic software to present mathematical work. Mathcad is seen as a useful tool for scientists and engineers and others to document their intellectual property and archive it in ways that support easy retrieval. Mathcad also integrates with other software types like CAD and CAE.

MathCAD remains the only system in which the description of the solution of mathematical problems is determined using the usual mathematical formulas and signs. MathCAD allows you to perform both numerical and analytical (symbolic) calculations, has an extremely convenient mathematical-oriented interface and great tools for scientific graphics.

MathCAD works with documents. From a user's point of view, a document is a blank sheet of paper that can accommodate blocks of three main types: mathematical expressions, text fragments, and graphic areas.

With PTC Mathcad programming you can write multiline functions and define iterative calculations. You can define complex comparisons and branching, and can return values. When a user defines a program, he can combine PTC Mathcad expressions and use iterations for compactness and efficiency. One can use programming operators to specify local assignments to variables or functions, loop over calculations, conditionally evaluate branches, add breakpoints, trap errors and return values. [2]

Mathcad is a tool to arrange, calculate and visualize engineering calculations. A Mathcad sheet has values, equations, plots, and functions that are written and displayed in a manner that is similar to how they are written in a textbook or reference manual. As inputs in the worksheet are updated, all dependent calculations are also updated. Mathcad is a different computational tool than a full programming language like MATLAB or Python or even a spreadsheet language like VBA. [3] In general, Mathcad is best suited to

symbolic or numerical analysis to replace an engineering graphing calculator or calculation pad. It is not as well suited to handle large amounts of tabular data or when computational speed is a priority. Instead, it is useful to derive symbolic expressions, visualize data, and quickly prototype a problem that is typical of engineering homework.

Conclusion

Traditional programming, a simplified version of which is used in Mathcad and implemented using the Programming toolbar, has a number of significant advantages, which in some cases make the document simpler and more readable - the possibility of using cycles and conditional statements, easy creation of functions and variables that require a few simple steps, the ability to create functions that contain private code for the rest of the document, including the advantages of using local variables and handling exceptional situations. To conclude Mathcad can be used extensively in different science and education areas for solution of mathematical problems.

REFERENCES

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