

# The creation of e-book in the CAS Mathcad

Anastacija S. Gurinovich, Genady Ch. Shushkevich

Grodno State University  
Ozhesko str., 22, Grodno, 230023, Belarus  
g-shu@tut.by

**Abstract.** *The proposed e-book on methods of the numerical analysis on the basis of CAS MathCad represents a set of system briefs and the program modules carried out in the internal language MathCad. The e-book contains text and graphic information, the developed commands of the system, and also the modules of knowledge testing and of estimation. One of the advantages of the e-book is that its medium contains extra possibilities for processing of information and for analytical transformations and numerical calculations.*

## 1 Introduction

In modern educational institutions great attention is given to the computer support of professional work. Gradually as an alternative or an addition to system of correspondence education a concept of distant education was proposed. With the emergence of the first teaching materials methodical recommendations, the elaboration, and then and e-books began to appear for the support of various courses in the system of distant education. Gradually the industry on the creation such e-book began to extend beyond the limits of the systems of distant education.

## 2 MathCad as means for the creation of the e-book

The way offered for the creation of the e-book differs from the others by fact that its medium contains extra possibilities for processing of information and for analytical transformations and numerical calculations. The newest technologies also allow the usage of MathCad system together with Internet browsers, therefore the using of this system in distant education is very perspective. The e-book in the system MathCad is the interconnected sets of the documents arranged the thematic sections, concerning for various spheres of the system application. The documents cause each other, providing the hypertext cross references. The quantity of interconnected documents in one book can be enormous, to several hundreds. It is possible to use the e-book as the usual book, for the reception of the necessary information. Certainly, for this purpose the computer with the installed system MathCad

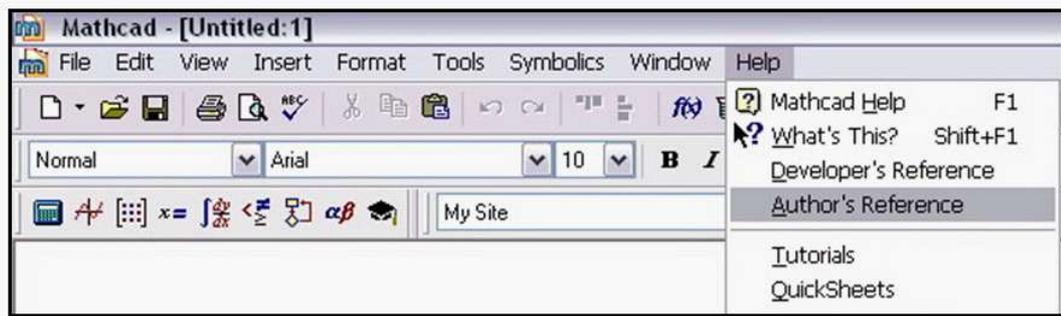


Figure 1: Author's Reference.

```
.version 14
.title The book name
SPLASH default.mcd
TOP index.mcd
MyBook1 MyBook1.mcd The topic name1
MyBook2 MyBook2.mcd The topic name2
```

Figure 2: The file MyBook.hbk.

is needed. As the e-book represents usual documents in MathCad - they are looked through in the editing window of this system. They can be edited, filled up and modified. For example, it is possible to translate texts from the e-book into Russian, without leaving MathCad system. Thus, the system will keep the altered and the initial versions of the e-book. So the original can always be restored after modernization. The creation e-book is remarkably simple, once you know how. The Author's Reference is located under the Help menu as shown below fig.1.

Once the Author's Reference is opened, click to Creating an Electronic Book, as handbooks are currently known. Rather than repeat the details from the Author's Reference, we give a simple example of "MyBook" for you to edit and update. It is much easier to experiment starting with a working example. To begin with, it is necessary to create demanded documents in MathCad which will serve as ordinary pages in the book: working files, the main page which will be displayed when starting the file default.mcd, and a file maintenance index.mcd. Then it is necessary to create the file actually.hbk. For this purpose it is necessary to open a notebook in order to set there a usual text file MyBook.txt where it is necessary to register the following parameters: .version 14 - heading for the program version.title - the book name, SPLASH - the name of the page which will be displayed at the e-book opening, TOC - follows this line parameter the name of the page which will play a maintenance role. Then rename the file from MyBook.txt in MyBook.hbk. The file MyBook.hbk will look like fig.2.

The bottom lines list the working files the MathCad used in the document: MyBook1 - the name of the file without extension, MyBook1.mcd - the name of the file with expansion, the file name will be displayed in page heading. Now we have

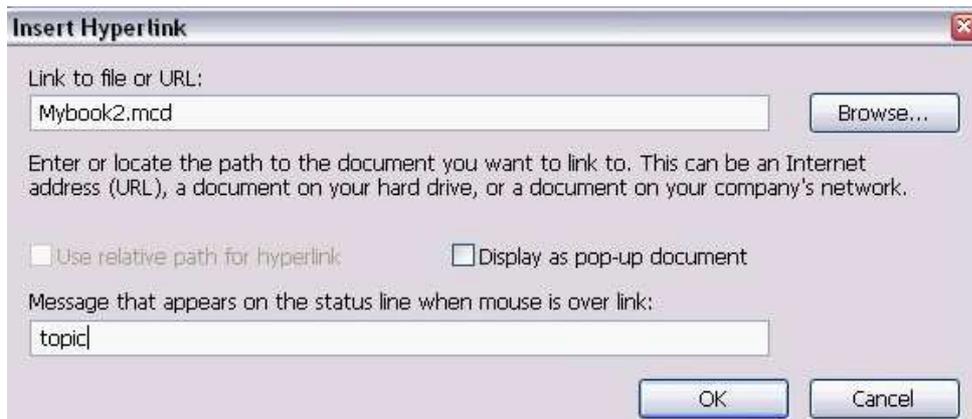


Figure 3: Insert Hyperlink.

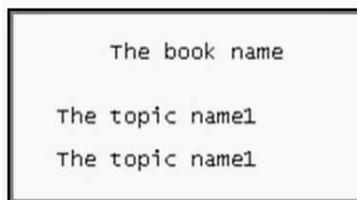


Figure 4: Opening the file.

already a basic file which will open with MathCad. It is necessary to give the final touch to the files of maintenance, introduction and calculations. For this purpose it is necessary to supply them with the text and schemes from Electronics Workbench, and also to supply with references to other pages. It is also necessary to allocate the text (picture) and to choose an option Hyperlink from the menu Insert. There will be the following dialog window fig.3.

Above, it is necessary to specify the file, which will be referred to. Below - that you would like to see in the line of the condition. After that, if moving the cursor at the reference, there will be an index which will look like a hand. Then it is necessary to place all files in a folder with the same name the file .hbk. In this case, in the folder MyBook. We should open the file fig.4.

Sometimes, the big quantity of the references and files are included into the structure of the e-book. There is a requirement for the system MathCad to check itself the correctness of the references and correctness of drawing in the file .hbk. For this purpose, there is a built in mode for debugging. Choose item to execute in menu Start-up for access. In the window which appears one should register the way to execute the file in MathCad with parameter /hbkmode. After MathCad is loaded, there will appear the window fig.5.

In the appeared dialogue window it is necessary to choose the file .hbk and to put a flag at the item Check Handbook. After that, in case of an error, the window will appear



Figure 5: The correctness of the reference.

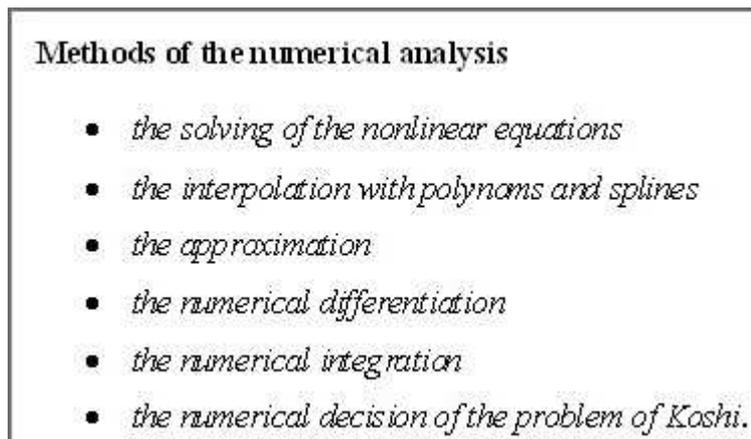


Figure 6: The e-book on the discipline "Methods of the numerical analysis".

### 3 The e-book on methods of the numerical analysis

The e-book on the discipline "Methods of the numerical analysis" has been created by us. It consists of six sections: the solutions of the nonlinear equations, the interpolation with polynomials and splines, the approximation, the numerical differentiation, the numerical integration, the numerical decision of the problem of Koshi, fig 6.

Each of them includes:

- 1) the theoretical material
- 2) the methodical instructions on independent studying of a course;
- 3) the hung-up of the practical tasks on each theme;
- 4) the solving of the typical variant of the practical task, fig. 7;
- 5) the dictionary of the terms;
- 6) lists of the basic and additional literature.

The main objective of the e-book is to help the student to seize more effectively fundamental concepts and theories of the numerical analysis, the methods of the solving of the specific objectives. The e-book has been developed so that the student should not only to remember the information, but also associate it with typical professional situations. The main criterion of the mastering of the course is to show,

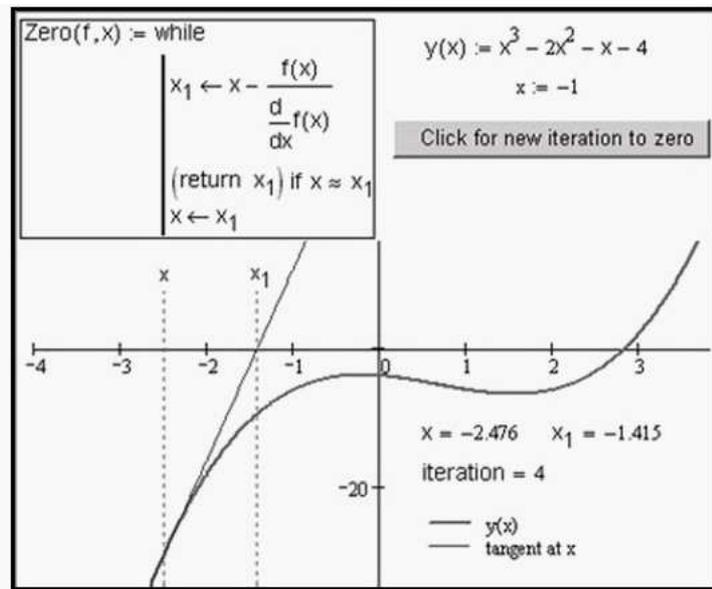


Figure 7: The section "The solving of the nonlinear equations".

how the knowledge is realized in practice. It is planning to use the e-book as one components of the method of cases, and to train students to make use of distant technologies is planed.

## References

- [1] *Brent Maxfield*. Engineering with Mathcad: Using Mathcad to Create and Organize your Engineering Calculations. Dover Publications Inc., New York (2006)
- [2] *Brent Maxfield*. Essential MATHCAD for Engineering, Science, and Math. Academic Press, New York (2009)
- [3] *Shushkevich G.Ch., Shushkevich S.V.* Computer technology in mathematic.CAS Mathcad. Publisher Grevtsova, Minsk (2010) [in Russian]
- [4] <http://www.ptc.com/products/mathcad/>

The Mathcad Application Server supports all built-in math functionality within Mathcad for the creation of Mathcad Web pages, in addition to support for user EFIs. The Mathcad Application Server is not a substitute for the full power and interactivity of Mathcad, but rather a way to use Mathcad to distribute math-oriented Web content. The Mathcad Application Server gives end-users the ability to recalculate worksheets with different parameters and without needing any special plug-ins installed on the client's computer system. You can use a computer that meets the minimum system requirements in the table below. If you anticipate more activity, the Mathcad Application Server should run on a system with the recommended resources listed below. Mathcad is computer software for the verification, validation, documentation and re-use of mathematical calculations in engineering and science, notably mechanical, chemical, electrical, and civil engineering. Released in 1986 on DOS, it introduced live editing (WYSIWYG) of typeset mathematical notation in an interactive notebook, combined with automatic computations. It is a product of Parametric Technology Corporation. Three Mathcad worksheets allow full mathematical follow-up of the equations given in the previous chapter. Complete calculations of the CAS variants are given. Complete calculations of the CAS variants are given. Keywords. Specific Frequency Current Noise Noise Voltage Previous Chapter Complete Calculation. These keywords were added by machine and not by the authors. This process is experimental and the keywords may be updated as the learning algorithm improves. This is a preview of subscription content, log in to check access. The E-book book design should invite students to make changes in the examples. and develop insights into how parameter variations change the answers to problems and affect. motor performance. A novel use of Mathcad designed for undergraduate electric machines courses bridges existing knowledge and skill gaps in the study of engineering economics and energy efficiency. Combining economics, efficiency and machine theory with detailed computer-based examples prepares students for employment where these principles must be applied to make design decisions. Mathcad supports custom designed documents called electronic handbooks that explain complex topics and provide reusable computational templates. 2: Getting Started with Mathcad The Mathcad Workspace Regions A Simple Calculation Definitions and Variables Graphs Saving, Printing, and Exiting. 3: Online Resources Mathcad Resources User Forums Other Resources. You can find these resources in the Mathcad Resources window under the Help menu: • Tutorials include introductory Primers and more extended tutorials. • QuickSheets are sample Mathcad worksheets that you can revise for your own use. • Online Help provides more extensive details on features and functions. Other Resources. We provide other resources for learning about Mathcad: • Mathcad User Forums where current users will answer many questions at