The solution of differential equation of physical problem by the use of Matlab

Erika Fechová

Technical University of Košice, Faculty of Manufacturing Technologies of the Technical University of Košice with a seat in Prešov, Department of Informatics, Mathematics and Cybernetics
e-mail: erika.fechova@tuke.sk

Abstract

At the present time teachers try to introduce and use information technologies in educational process of technical subjects at schools as mathematics, physics, chemistry. Apart from e-learning support (electronic materials and textbooks available on the internet), there are various mathematical software environments as Matlab, Mathematica, MS Excel etc. The paper points out the possibility of Matlab utilization at solving differential equation of physical problem.

Physical problem provides knowledge in various forms – as a means of motivation, information about examined phenomenon, but also as a set of functions needed for the solution of the problem. A student – solutionist of physical problem – has to carry out a certain programe consisting of partial functions - steps [1]. Creation of mathematical models of physical phenomena is an important part of physical problems solution. Modelling is one of theoretical cognitive methods whose characteristic feature is cognitive process, in which examined phenomenon – an original cognitive object – is replaced by a model cognitive object – a model. Under the term of mathematical model is understood a sum of mathematical relations capable of quantitative description of physical phenomenon. Mathematical model is an abstraction and idealization of real phenomenon [2]. Model has to be created as a functional one. Functionality of model is estimated according to its behaviour at the change of conditions, at which it works. The form of mathematical model depends on used mathematical tools. Mathematical model of physical problem solved within the subject of Physics of bachelor´s studies at the Faculty of Manufacturing Technologies of the Technical University of Košice with a seat in Prešov is presented in the following part of the paper. The solution of physical problem leads to the system of two differential equations of the second order without or with the right side of equation. An analytic solution of the problem is complex and it does not lead to such simple dependancies. The problem will thus be solved numerically by using an interactive programme Matlab [3].

References
[1]   V. Koubek. Riešenie fyzikálnych úloh. MFF UK Bratislava, 1987.

[2]   V. Koubek, I. Pecen. Matematické modelovanie fyzikálnych javov. Fyzikálne listy č.3, 1996.

[3]   F. Dušek. MATLAB a SIMULINK úvod do používání. Univerzita Pardubice, 2002. ISBN 80-7194-273-1.