

MODELING OF DYNAMIC SYSTEMS USING MAPLE

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This report presents the capabilities of the software product for building models of dynamic systems with subsequent computer simulation and conducting virtual experiments in Maple, as well as the results of its implementation in the educational process.

Creating a mathematical model of the system using symbolic expressions is available for both systems of differential equations and other mathematical expressions, with the ability to transition between discrete and continuous systems [1]. Further changes to the model's parameters allow evaluating their impact on the system's behavior. Numerical integration of the system of equations is also applied to model the system's behavior over time, using various parameter values and input data. The analysis of results includes generating graphs, computing numerical characteristics of the system, and identifying stable and unstable equilibrium points. Notably, the software product allows the use of Maple for optimizing system parameters or designing control strategies. One of the tasks involves conducting multiple virtual experiments to explore various scenarios and aspects of the system [2].

The implementation of simulating the behavior of dynamic systems allows studying different characteristics of these systems, optimizing their performance, exploring their stability and dynamics, and ultimately gaining a better understanding of their behavior without the need for physical experiments. The software product is integrated into the educational process for students majoring in Applied Mathematics. The experience of using this package as an educational tool in the study of discrete and continuous dynamic systems demonstrates its significant capabilities.

REFERENCES

- [1] Lynch S. (2009). *Dynamical Systems with Applications using MapleTM (2nd ed.)*. Boston: Birkhäuser.
- [2] Udriste C., Tevy I. (2021). *Dynamical Systems and Differential Geometry via MAPLE*. Cambridge Scholars Publishing.

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