

Component modeling of complex dynamical systems

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Problem book abstract

In the problem book, educational projects are:

- Learn the principles of Object-Oriented Modeling (OOM),
- Learn how to develop models consisting of
 - 1) components with "inputs-outputs" (directed or oriented links), used, for example, in control theory,
 - 2) components with "contact-flows" (non-directional or undirected links) used for "physical" modeling,
 - 3) components - agents, well suited, for example, for queuing tasks.

Using the modeling environment of RMD in teaching modeling technologies allows not only to get skills in working with its own technologies, but also get acquainted with the technology of creating models in

- Matlab package - RMD uses vector-matrix form of equations representation, knows how to solve linear and nonlinear algebraic equations, differential and algebra-differential equations,
- SIMULINK package - there is a special library that simulates the blocks of the Simulink package,
- OpenModelica environment - RMD borrows and extends the "physical" modeling technology of the Modelica language.

An application is included in the task book, which provides detailed solutions to tasks in all sections using the RMD environment.

Table of contents

Introduction.

Chapter 1. Practical example of using Object-Oriented Modeling

Chemical kinetics reaction. Chemical kinetics equations. Model designing: superclass, inheritance, library. Components with B-charts. Computer experiment with objects.

Task 1.

Chapter 2. Components with inputs/outputs (causal modeling).

Block-diagrams for control systems. Stabilization problem.

Task 2.

Chapter 3. Components with contacts/ flows («physical» modeling)

Electrical circuits. RMD library for electrical circuits. Event-driven electrical circuits.

Task 3.

Appendix. Complex model. Tasks.

Literature

Target group

The book is intended for bachelors and masters of all engineering specialties related with computer modeling and simulation of complex dynamical systems.

Book imprints

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The problem book was translated in English by prof. Maimun A. from University Technology Malaysia, Johor Bahru.