

Modeling and Simulation of Dynamic Systems using Wolfram SystemModeler

Bachelor Level

Contents

Introduction

1. Component-based modeling

Principles of mathematical and computer modeling and simulating. Constructing models as systems of algebraic and differential equations (DAE). Methods of solving the DAE systems. Getting started with Wolfram SystemModeler and Modelica language.

Contents

3. Single component systems

Continuous-time models. Continuous and hybrid time, discrete events, behavior graph. Hybrid models. Single state and multiple state models.

4. Multicomponent systems

Systems with oriented and unoriented bonds. Contacts and flows. Control systems modeling. Electrical systems modeling. Electrical analogy method for modeling of mechanical and hydraulic systems.

Contents

5. Simulation and analysis

Simulation of continuous-time and hybrid models.
Numerical experiment. Analysis and visualization using
Wolfram Mathematica.

6. Built-in libraries

Developing models using built-in libraries. Some examples.

Conclusion