Abstract

Master Degree

on theme

« Modelica: object-oriented language for hybrid modeling »

by

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The actuality

During the last two decades, the interest for computer aided modeling and simulation of complex physical systems has witnessed a significant growth. The recent possibility to create acausal models, using components from different domains (e.g., electrical, mechanical,and hydraulic) enables new opportunities. Modelica is one of the most prominent equation-based object-oriented (EOO) languages that support such capabilities, including the ability to simulate both continuous- and discrete-time models, as well as mixed hybrid models.

That is why, research of Modelica opportunities, comparing them with the pack and language ALLTED for further integration are actual tasks.

The purpose

Main diploma thesis object is to explore the possibilities of Modelica language and features of hybrid modeling and to make comparative analysis of Modelica and Allted languages.

Solved problems

As part of mentioned goal, next tasks were taken into consideration:

- Investigation of characteristics, features and application of object-oriented modeling language Modelica.

- Comparative analysis of Modelica Allted languages.

- Investigation of hybrid modeling in Modelica.

Achieved results

Having resolved described tasks, the author defends:

- Results of the investigation of features, capabilities and use of object-oriented modeling language Modelica.

- Results obtained from comparative analysis of Modelica and Allted languages.

- Results of the investigation of Modelica hybrid modeling.

Scientific novelty of the work

Scientific novelty of the work can be described as next:

- Accordances and differences in Modelica and Allted mathematical apparatus and implementation of their library items were found by the results of analysis.

- The practical results of modeling schemes on both packages were obtained and comparison of the effects of various factors on the simulation results was made.

- Compatibility of Modelica and Allted elements was research practicaly.

The practival value of the work

The practical value of the work consists of next:

- The result of the analysis can find the differences and compliance in Modelica and Allted implementations.

- The influence of various factors on the process of scheme simulation was investigate experimentally.

- Suitable software for the interpretation of the models described in Modelica and Allted languages was established.

Conclusions

- The features, capabilities, and use of Modelica language were investigated.

- Comparative analyzes of Modelica and Allted languages ware made.

- The features of hybrid modeling in Modelica were investigated.

- The influence of various factors on the simulation process was investigate experimentally.

- Interpreter of Modelica and Allted models was made.

Diploma thesis contains 93 pages, 30 images, 9 tables, 19 references.

Keywords: hybrid simulation, Modelica, OpenModelica, Allted, comparative analysis.