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Wittenmark, Björn

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LUND UNIVERSITY

PO Box 117
221 00 Lund
+46 46-222 00 00

MASTER THESES IN AUTOMATIC CONTROL 77/78

BJÖRN WITTENMARK

Department of Automatic Control
Lund Institute of Technology
March 1979

Dokumentutgivare
Lund Institute of Technology
Handläggare Department of Automatic Control
Författare
Björn Wittenmark

Dokumentnamn
REPORT LUTFD2/(TFRT-6009)/1-21/(1979)
Utgivningsdatum
March 1979
Ärendebeteckning
6676

10T4

Dokumenttitel och undertitel
Master theses in Automatic Control 77/78.

Referat (sammandrag)
This report contains abstracts of master thesis (examensarbete) made at the Department of Automatic Control, Lund, during the academic year 77/78. During this year 16 theses were made by 23 students. The theses are written in Swedish with an English abstract.

Referat skrivet av
Author

Förslag till ytterligare nyckelord
44T0

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50T0

Indexterminer (ange källa)
52T0

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Pris 66T0

1. INTRODUCTION

The education for civilingenjörsexamen (master degree in engineering) is completed with an independent work, a master thesis (examensarbete). It should show the student's ability to attack and solve a larger problem. The time devoted to the thesis is about three months of full time work. The thesis can be done individually or by two students together.

This report is a collection of the document pages of the theses completed during the academic year 1977/1978. During this time 16 theses were finished by 23 students. The diagram below shows the number of theses and students during the time 64/65 - 77/78. Total 213 theses by 278 students have been finished during this time.

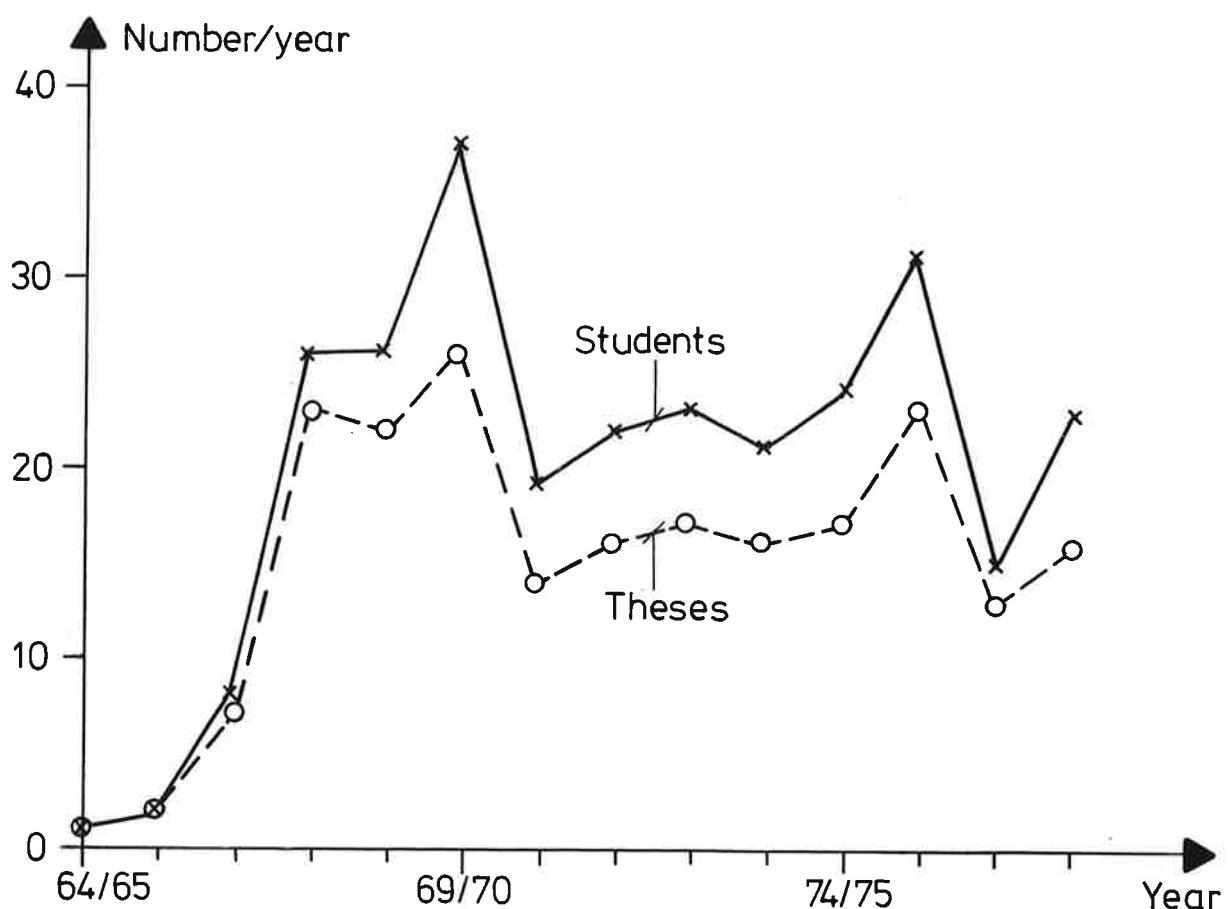


Fig - Master theses in Automatic Control from 64/65 until 77/78.

The major part of the theses is made within the framework of the research program at the department. Some of the theses are, however, made as feasibility studies or made in cooperation with the industry or other departments. This report can thus be regarded as a supplement to the survey of the research activities at the department reported in:

Åström, K J and Olsson, G: Activity report 1977 - 1978, TFRT-4010, Department of Automatic Control, Lund Institute of Technology, Lund, Sweden.

Further information concerning the results can be obtained from the Department of Automatic Control by contacting the advisor. The theses are available at the University Library in Lund (Address: University Library 2, Box 1010, S-221 03 LUND, Sweden).

2. LIST OF THESES

- TFRT-5197 Gestrelius, S: Hodkin-Huxley modellen anpassad till låg frekventa nervimpulser (The Hodgkin-Huxley model applied to low frequency repetitive firing nerves), August 1977.
- TFRT-5198 Westerberg, B: Självinställande regulator baserad på polplacering (A self-tuning regulator based on pole placement), August 1977.
- TFRT-5199 Nordström, H, Svensson, L: Mätning, modellbygge, simulering och reglering tillämpat på en anläggning med värmepump (Measuring, modelling, simulation and control of a heat-pump), September 1977.
- TFRT-5200 Holmqvist, B, Larsson, L-E: Laboratorieprocess för flödesystem (Laboratory process for flow systems) August 1977.
- TFRT-5201 Persson, C: Generell assembler i STAGE 2 (General assembler in STAGE 2), October 1977.

- TFRT-5202 Pålsson, T, Rading, L: Program för loggning och dataanalys på PDP 11/03 (Program for logging and data analysis on PDP11/03), November 1977.
- TRFR-5203 Karlström, H: Minidatorsystem för styrning av hängtransportöranläggning (A computer system for mailbag sorting), December 1977.
- TFRT-5204 Vonheim, T: Mikrodatorreglering av en tunnelugn (Micro-computer control of a tunneloven), December 1977.
- TFRT-5205 Apelblat, J, Rydström, P: Frånluftstemperaturreglering av flerfamiljshus (Return air temperature control of an apartment house), December 1977.
- TFRT-5206 Andersson, J, Melin, J: Bestämning av parametrar i dynamisk modell för insulinsvar på glykoslast (Quantification of parameters of a dynamic model for insulin response to glucose load), January 1978.
- TFRT-5207 Larsson, C, Lindgren, H: Program för frekvensanalys på PDP11/03 (Program for frequency analysis on PDP11/03), May 1978.
- TFRT-5208 Lindgren, S: Decentraliserad reglering av stora system med självinställande regulatorer (Decentralized control of large-scale systems using self-tuning regulators), May 1978.
- TFRT-5209 Hägglund, T: Reglering av yoghurttillverkning (Control of yoghurt manufacturing), May 1978.
- TFRT-5210 Hallström, L-G: Generella beräkningar på mätdata (Interactive program for computations on data files), June 1978.
- TFRT-5211 Nilsson, B, Tillberg, K: Analys av reglersystemet till en cigarettmaskin. (Analysis of the control system for a cigarette machine), June 1978.
- TFRT-5212 Josefson, G: Dynamiska modeller för belastning på ett kraftsystem (Dynamic models for the load on a power system), June 1978.

3. SUBJECT LIST

<u>Subject</u>	<u>Thesis</u>
Adaptive systems	5198, 5208
Analysis and synthesis	
Climate control	5199, 5205
Food processing	5209
Power systems	5212
Biological systems	5197, 5206
Computer control	5203, 5204, 5211
Data analysis	5202, 5207, 5210
Laboratory processes	5200
Program development	5201

4. DOCUMENTPAGES

The following pages contain the documentpages of the theses. All the theses are written in Swedish with an abstract in English. On the document page the following data are given: Report Number (Dokumentnamn, Dokumentbeteckning), Adviser (Handläggare), Author (Författare), Title in English and Swedish (Dokumenttitel och undertitel) Abstract (Referat), and Keywords (Förslag till ytterligare nyckelord).

Dokumentutgivare

Lund Institute of Technology

Handläggare

Ren Hagander

Författare

S0T0

Staffan Gestrelius

Dokumentnamn

REPORT LUTFD2/(TFRT-5197)/1-033/(1977)

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Aug 1977

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Ärendebeteckning

0676

1014

Dokumenttitel och undertitel

The Hodgkin-Huxley model applied to low frequency repetitive firing nerves
 (Hodkin-Huxley modellen anpassad till lågfrekventa nervimpulser)

Referat (sammandrag)

The cell membrane potential is derived as a function of the membrane selective permeability and concentration gradients across the membrane. Hodgkin-Huxley's nerve model is introduced and by use of digital simulation it is shown to be inadequate in describing a low frequency repetitive firing nerve. Simple modifications, not altering the interpretation of the equations, give a more realistic model. The modified model is analyzed mathematically.

Referat skrivet av

author

Förslag till ytterligare nyckelord

The Goldman equation, repetitive firing nerves, slowly adapting nerve cells

Klassifikationssystem och -klass(er)

50T0

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 0676

1074

Dokumenttitel och undertitel

Självinställande regulator baserad på polplacering. (A self-tuning regulator based on pole placement).

Referat (sammandrag)

This report presents a self-tuning regulator based on pole placement. The regulator is obtained by combining a recursive least-squares estimator with a control law enable to give the closed-loop system desired poles. Two variants of the regulator are described, one implicit algorithm and one explicit algorithm. The implicit algorithm that directly estimates the parameters in the control law requires that the process is minimum phase. The explicit algorithm admits nonminimum phase processes. Simulated examples illustrate the basic properties of the algorithms.

Referat skrivet av
Author

Förslag till ytterligare nyckelord
 6410

Klassifikationssystem och -klass(er)
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 5810

Dokumentutgivare
Lund Institute of Technology
Handläggare Dept of Automatic Control
Lars Jensen
Författare
Hans Nords tröm
Lennart Svensson

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Sept 1977

Dokumentbeteckning
LUTFD2/ (TFRT-5199)/1-120/(1977)
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BFR 740622-5

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Dokumenttitel och undertitel

Mätning, modellbygge, simulering och reglering tillämpat på en anläggning med värmepump.

(Measuring, Modelling, Simulation, and Control of a Heatpump)

Referat (sammandrag)

A heat pump for heat recovery as a part of an airconditioning system has been studied. Measuring, modelling, computer simulation and fullscale control experiments have been carried out. The heatfactor has been measured to be in the interval 5-6. The heat pump can be controlled in 8 steps. A P-regulator cannot be used and a PI-regulator will switch on an off one step. This can be avoided if the quotient regulator (new input = setpoint × last input / last output) is used. In this case the disadvantage is the steady state error, which can be as large as half the output change from one step. This can, however be accepted.

Referat skrivet av
Lars Jensen

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1GT0

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Per Hagander
Författare
Berndt Holmqvist
Lars-Eric Larsson

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REPORT
Utgivningsdatum
Aug 1977

Dokumentbeteckning
LUTFD2/(TPRT-5200)/1-103/(1977)
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0616

1014

Dokumenttitel och undertitel

Laboratorieprocess för flödessystem
(Laboratory Process for Flow Systems)

Referat (sammandrag)

A Laboratory process for flow systems has been constructed and produced. The process has been examined with experiments.

The flow system consists of tanks connected by pipers. Different tank- configurations can be examined, for example series connection, parallel connection and recirculation. Water is pumped through the system and saturated NaCl-solution, which is used as a tracer, propagates through the system in the same way as the water. NaCl-concentration is measured with a conductivity measurement, which is connected to a pen recorder.

Since the flow is constant the flow system can be described as a linear time invariant dynamical system of a special structure. Each tank in the system describes a first order system.

The experiments show a very good agreement with theoretical models.

Referat skrivet av

Authors

Förslag till ytterligare nyckelord

tank-system

Klassifikationssystem och -klass(er)

307.0

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 REPORT
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 October 1977

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 LUTFD2/(TFRT-5201)/1-52/(1977)
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 6676

1014

Dokumenttitel och undertitel

13TC
Generell assembler i STAGE2
 (General Assembler in STAGE2)

Referat (sammandrag)

In this thesis an assembler, which can be used for different microprocessor assembler languages, has been constructed.

The assembler consists of two parts. One general part, which contains common qualities on the different microprocessor languages. The other part contains specific qualities on the language, which the assembler is intended to be used for. Such specific qualities is e.g. the syntax of the instructions and the machinecode.

The assembler is based on the macroprocessor STAGE2 and is intended to be implemented on a host machine.

The assembler generates an objectprogram from assemblercode.

Referat skrivet av**Author****Förslag till ytterligare nyckelord**

Assembler, STAGE2, macro processor, microcomputer, portability

Klassifikationsystem och -klass(er)

S010

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S010

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Handläggare

Ivar Gustavsson

Författare

Tome Pålsson and Leif Rading

Dokumentnamn

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Nov 1977

Dokumentbeteckning

06T6

Ärendebeteckning

06T6

10T4

Dokumenttitel och undertitel

Program for logging and data analysis on PDP11/03.

(Program för loggning och dataanalys på PDP11/03)

Referat (sammandrag)

A program for data collection, control and data analysis is developed for a PDP11/03 computer. The program is partly interactive, and partly of question/answer type and runs under the RT11 Foreground/Background monitor.

The program is thought as a base for further development. A user can make an extension to the control and data analysis by including own subroutines.

Referat skrivet av

42T0 author

Förslag till ytterligare nyckelord

44T0

Klassifikationssystem och -klass(er)

50T0

Indexterminer (ange källa)

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Handläggare Dept of Automatic Control
Göte Olsson

Författare

HÖT Karlström

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Utgivningsdatum

Dec 1977

Dokumentbeteckning

Årsdatabeteckning
6676

1074

Dokumenttitel och undertitel

Minidatorsystem för styrning av hängtransportörsanläggning
(A computer system for mailbag sorting)

Referat (sammandrag)

This work contains the projection and the construction of a minicomputer-regulated conveyor system for carrying mailbags. The system shall transfer mailbags from 3 loading stations and sort them to 173 different destinations. The computer-system consists of an ALPHA LSI-2 minicomputer and a teletype ASR33 terminal. A large number of in- and output signals are connected to the computer for control and regulation of the system. Six controldesks are connected to the computer. The software is written in assembler language and contains about 13K program and 9K lists in memory

Referatskrivet av
author

Förslag till ytterligare nyckelord

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Klassifikationssystem och -klass(er)

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6676

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Handläggare

Ján Holst

Författare

Thomas Vonheim

Dokumentnamn

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December 1977

DokumentbeteckningÄrendebeteckning
0676

1074

Dokumenttitel och undertitel

1870

Microcumputer control of a tunneloven
(Mikrodatorreglering av en tunnelugn)**Referat (sammandrag)**

2610

In connection with the final burning when manufacturing sanitary porcelain it is necessary to control the temperature along the oven according to an experimentally determined temperature profile. In this report a micro-computer based control system of the burners in the oven is presented. One of the control loops have been implemented and the development of the necessary programs and equipment such as for example motor and thermo-couple is discussed. The proposed control has been successfully tested in the factory.

Referat skrivet av

Author

Förslag till ytterligare nyckelord

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Dokumentnamn

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10T4

Dokumenttitel och undertitel

¹⁸⁵⁰
 Frånluftstemperaturreglering av flerfamiljshus
 (Return Air Temperature Control of an Apartment House)

Referat (sammandrag)

The indoor air temperature in an apartment house is only controlled by feed-forward control. The outdoor air temperature determines the radiator feedforward temperature. This type of control does not take in account such factors as sun, wind, persons, and heat production from household machines. The return air temperature has been controlled for an apartment house with good result. A small energy reduction can be achieved.

**Referat skrivet av
authors****Förslag till ytterligare nyckelord**

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Klassifikationssystem och -klass(er)

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56F0

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Jan 1978

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Ärendebeteckning
0675

10T4

Dokumenttitel och undertitel

**Bestämning av parametrar i dynamisk modell för insulinsvar på glykoslast
(Quantification of Parameters of a Dynamic Model for Insulin Response to
Glucose Load)**

Referat (sammandrag)

Quantification of parameters of a simple dynamic glucose-insulin model was performed. Measured data from seven test subjects were used. The model was simulated by SIMNON and optimized by OPTA. The results are presented and their validity are discussed. Some problems when using OPTA are given account for.

Referat skrivet av**Authors****Förslag till ytterligare nyckelord**

10T4

Klassifikationssystem och -klass(er)

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Handläggare
Ivar Gustavsson
Författare
Christer Larsson and Harriet Lindgren

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Report LUTFD2/(TFRT-5207)/1-119/(1978)
Utgivningsdatum
May 1978
Dokumentbeteckning
Årsändebeteckning
0616

1014

Dokumenttitel och undertitel
Program for frequency analysis on PDP11/03.

Program för frekvensanalys på PDP11/03

Referat (sammandrag)

A program for frequency analysis using the correlation method is developed for a PDP11/03 computer. The program is based on the program INMAT, and runs like this under the RT11 Foreground/Background monitor. The program is partly interactive, and partly of question/answer type.

Referat skrivet av
authors

Förslag till ytterligare nyckelord
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Klassifikationssystem och -klass(er)

5010

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Utgivningsdatum
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0656

Dokumenttitel och undertitel
Decentralized control of large-scale systems using self-tuning regulators
Decentraliserad reglering av stora system med självinställande regulatorer

Referat (sammandrag)
The problem of controlling a large-scale system is sometimes solved by using decentralized control. Such control using self-tuning regulators based on least squares estimation and minimum variance control is considered. Theory and simulations indicate that the regulators generally converge in such a way that the control will be "optimal" under the actual conditions.

Referat skrivet av
Author
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06T6

10T4

Dokumenttitel och undertitel

18T0 Control of yoghurt manufacturing
(Reglering av yoghurttillverkning)

Referat (sammandrag)

26T0 The thesis deals with the control of a process for continuos manufacturing of yoghurt. A mathematical model describing the changes in the pH value during the process is developed. By adjusting one parameter the model can be fit into different operational conditions. As the process is slow, the control must be based on sampled measurements. Finally some possib lecontrol strategies are described, both manual and automatic.

Referat skrivet av
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0410 Lund Institute of Technology
 Handläggare Dept. of Automatic Control
 0610 Johan Wieslander

Författare

0370 Lars-Göran Hallström

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1870

Generella beräkningar på mätdata.

(Interactive program for computations on data files)

Referat (sammandrag)

An interactive program which performs computations on data files is presented. The basic idea is that the user describes the computations by writing statements in a file. The statements are similar to those used in SIMNON. The statements are compiled and a pseudocode is created. By interpreting this code the program can perform the computations. The program is run by entering commands from a teletype. The arguments of the command consist of the names of the current data files.

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Dokumentutgivare

0410 Lund Institute of Technology

Handläggare

0610 Jan Holst

Författare

0810

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1810

Analys av reglersystemet till en cigarettmaskin.

(Analysis of the control system for a cigarette machine)

Referat (sammandrag)

2610

A central problem when producing cigarettes is the weightvariations of the cigarettes. This report presents an analysis of a cigarettemachine with attaching regulation system. When analysing, we have especially been interested in factors that affect, and the possibility of minimizing, the standard deviation of the cigarettes.

Referat skrivet av

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Handläggare

06T0
Jan Holst

Författare

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18T0
Dynamic models for the load on a power-system
(Dynamiska modeller för belastningen på ett kraftnät)

Referat (sammandrag)

26T0

In connection with investigations of the stability of the power-system, different kinds of load characteristics are being studied. In this report different methods to represent the dynamic frequency- and voltage-dependence of the load are presented. The results were acceptable just in case either frequency or voltage were separately taken into account. In other case the results were not satisfactory.

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