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Effective computer analysis of event-continuous and hybrid systems is addressed. A multipurpose software architecture employing control of the integration step size with regard to the error, stability, and unilateral events is proposed. The problem of synchronization of continuous and discrete processes is dealt with. All new theoretical concepts are tested on heterogeneous applications to biological systems, large electric power systems, mechanical engineering and chemical kinetics problems.

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Contents

Preface	7
1 Event-Continuous Systems	9
1.1 Discrete-Continuous Models	9
1.2 Continuous Models	15
1.2.1 Solution Dependence on the Initial Conditions	17
1.2.2 Lyapunov Stability	17
1.2.3 Caratheodory's Conditions	18
1.3 Discrete Models and Zeno Behavior	21
1.3.1 Zeno Phenomenon	22
1.3.2 Harel Statecharts	25
1.4 Modes and Events	25
1.5 Local and Global Behavior	28
1.6 Discontinuity Classification	29
1.6.1 Change of Initial Conditions	29
1.6.2 Change of the Values of Right-Hand Side Parameters	30
1.6.3 Changing the Right-Hand Side Form without Changing the Set of Continuous State Variables	32
1.6.4 Changing a Hybrid System Mode Right-Hand Side along with Changing the Set of Continuous State Variables	33
2 Mathematical Foundations of HS Mode Numerical Analysis	37
2.1 Choosing a Numerical Scheme	37
2.2 Convergence	40
2.3 Stability	40
2.4 Runge-Kutta Methods	42
2.5 Stiffness	43
2.6 Accuracy (Error) Control	44
2.7 Stability Control	45
2.8 Step Size Control	47
2.8.1 Step Size Control with Respect to the Error	47
2.8.2 Step Size Control with Respect to the Stability	47

	A	
2.8.3	Step Size Control with Respect to the Error and Stability	48
2.9	Method of Order Two	48
2.10	Adams' Method	50
3	Correct Detection of Discrete Events	53
3.1	Hybrid System's Singular Regions	53
3.2	Problem of Correct Discrete Event Detection	54
3.3	Linearization and the Relaxation Method in Event Localization	56
3.3.1	Event Function Linearization	57
3.3.2	Relaxation Method in Event Detection	58
3.4	Ensuring Asymptotic Approaching the Event Surface for Explicit Schemes	59
3.4.1	Detection Algorithm with a One-Step Method of Order Two	60
3.4.2	Adams' Method in Event Detection	62
3.4.3	L-Stable Method in Event Detection	66
3.5	Hybrid Systems with Nontrivial Event Functions	71
4	Software	75
4.1	Architecture of the Modeling and Simulation Environment	75
4.2	Visual Computer Models	78
4.2.1	User-Defined (Macro) Blocks	79
4.2.2	Data Import	82
4.3	Textual Models	84
4.3.1	Specification of Discrete Behavior	84
4.3.2	Specification of Continuous Behavior	88
4.3.3	Macros in Textual Description	90
4.4	Block-Textual Models	93
4.5	Computer Model Analysis	96
4.5.1	Textual Model Analysis	96
4.5.2	Visual Computer Model Analysis	99
4.6	Graphical Interpretation of Simulation Results	102
5	Software Unification	105
5.1	Topicality and Problem Statements	105
5.1.1	Chemical Kinetics	105
5.1.2	Models with Distributed Properties	106
5.2	Construction of Chemical Kinetics Differential Equations	107
5.2.1	Syntax	109
5.2.2	Semantics	110
5.3	Supported Types of Partial Differential Equations	111
5.3.1	Textual Language LISMA_PDE	112

5.3.2	Modeling and Simulation of an HS with Distributed Properties	114
6	Modeling and Simulation Examples	117
6.1	Model of Two Tanks with Sluggish Valves	117
6.2	Interactive Simulation	120
6.3	Production–Distribution System Model	122
6.4	Transient Heat Conduction Model	129
6.5	Ring Modulator	131
6.6	Biosystems	136
6.6.1	Modeling and Simulation of Diffusion	136
6.6.2	Computer Modeling and Simulation of the Biliary System	138
6.7	Power Engineering	144
	Bibliography	153
	A Visual Modeling Languages of the ISMA Environments	161
	B Shortened Version of the LISMA_PDE Grammar	165
	C List of Handled Semantic Errors	169
	D Symbolic Computer Model of the Production-Distribution System	171