# Table of Contents

A Qualitative System Identification Method  
Shinji Abe  

Real-Time Self-Explanatory Simulation  
Franz Amador, Adam Finkelstein, and Daniel S. Weld  

Estimating Order from the Causal Ordering  
Jonathan Amsterdam  

Designing Transitions in Multi-Region Devices  
Prasanta Bose and Shankar A. Rajamoney  

Fuzzy Causal Simulation in Process Engineering  
Kouamana Bousson and Louise Trave-Massuyes  

Automated Modelling of Visco-Elastic Materials  
A.C. Capelo, L. Ironi, and S. Tentoni  

Behavior Abstraction for Tractable Simulation  
Daniel J. Clancy and Benjamin Kuipers  

Numeric Reasoning with Relative Orders of Magnitude  
Philippe Dague  

Focused Real-time Systems Monitoring Based on Multiple Anomaly Models  
Richard J. Doyle, Steve A. Chien, Usama M. Fayyad and E. Jay Wyatt  

Intelligent Model Selection for Hillclimbing Search in Computer-Aided Design  
Thomas Ellman, John Keane and Mark Schwabacher  

Generating Explanations of Device Behavior Using Compositional Modeling and Causal Ordering  
Patrice O. Gautier and Thomas R. Gruber  

A Qualitative System Theory: Introducing Global View into Qualitative Reasoning  
Yoshiteru Ishida  

Automated Model Selection for Simulation  
Yumi Iwasaki and Alon Y. Levy  

Deriving Monotonic Function Envelopes from Observations  
Herbert Kay and Lyle H. Ungar  

Reasoning about Models across Multiple Ontologies  
Takashi Kiriyama and Tetsuo Tomiyama  

A Qualitative Method to Construct Phase Portraits  
Wood W. Lee and Benjamin J. Kuipers
Approximation Operators in Distributed Modeling
Sui-Rino Ling and Louis Steinberg 138

Application Oriented Qualitative Reasoning
Robert Milne and Louise Trave-Massuyes 145

Order of Magnitude Reasoning using Logarithms
P. Pandurang Nayak 157

Innovative Design as Systematic Search
Dorothy Neville and Daniel S. Weld 167

Generating Quasi-symbolic Representation of Three-Dimensional Flow
Toyoaki Nishida 173

Representing and Reasoning about Physical Systems from a Functional Viewpoint
Mahmoud Pegah, Jon Sticklen, William Bond and James K. McDowell 183

Automatic Enhancement of Model Parsimony
Cis Schut and Bert Bredeweg 194

Using Qualitative, Numerical and Heuristic Knowledge to support Innovative Design
Nikitas M. Sgouros 204

Understanding Linkages
Howard E. Shrobe 212

On Temporal Abstraction in Qualitative Physics - A Preliminary Report
Peter Struss 219

Kinematic Synthesis with Configuration Spaces
Devika Subramanian and Cheuk-San (Edward) Wang 228

Qualitative Structural Analysis Using Diagrammatic Reasoning
Shirley Tessler, Yumi Iwasaki and Kincho Law 240

Qualitative design with envisionment
Bernard Yannou 250

Spatial Reasoning for Intelligent Control of Numerical Simulators
Ke-Thia Yao and Andrew Gelsey 260

Model Simplification by Asymptotic Order of Magnitude Reasoning
Kenneth Man-kam Yip 266

Qualitative Asymptotic Analysis of Complex Functions
Kenneth Man-kam Yip 273

Author Index 282