Francois Baccelli, Guy Cohen, Geert Jan Olsder and Jean-Pierre Quadrat, Synchronization and Linearity (Wiley, New York, 1992) 489 pages

Preface. PART I: DISCRETE EVENT SYSTEMS AND PETRI NETS. *Chapter* 1: *Introduction and Motivation.* Preliminary remarks and some notation. Miscellaneous examples. Issues and problems in performance evaluation. Notes. *Chapter* 2: *Graph Theory and Petri Nets.* Introduction. Directed graphs. Graphs and matrices. Petri nets. Timed event graphs. Modeling issues. Notes. PART II: ALGEBRA. *Chapter* 3: *Max-Plus Algebra* Introduction. Matrices in $\mathbb{P}_{max}$. Scalar functions in $\mathbb{P}_{max}$. Symmetrization of the max-plus algebra. Linear systems in C. Polynomials with coefficients in C. Asymptotic behavior of A^k. Notes. *Chapter* 4: *Dioids.* Introduction. Basic definitions and examples. Lattice properties of dioids. Isotone mappings and residuation. Fixed-point equations, closure of mappings and best approximation. Matrix dioids. Dioids of polynomials and power series. Rational closure and rational representations. Notes. PART III: DETERMINISTIC SYSTEM THEORY. *Chapter* 5: *Two-Dimensional Domain Description of Event Graphs.* Introduction. A comparison between counter and dater descriptions. Daters and their embedding in nonmonotonic functions. Moving to the two-dimensional description. Counters. Backward equations. Rationality, realizability and periodicity. Frequency response of event graphs. Notes. *Chapter* 6: *Max-Plus Linear System Theory.* Introduction. System algebra. Impulse responses of linear systems. Transfer functions. Rational systems. Correlations and feedback stabilization. Notes. PART IV: STOCHASTIC SYSTEMS. *Chapter* 7: *Ergodic Theory of Event Graphs.* Introduction. A simple example in $\mathbb{P}_{max}$. First-order theorems; Second-order theorems: nonautonomous case. Second-order theorems; autonomous case. Stationary marking of stochastic event graphs. Appendix of ergodic theorems. Notes. *Chapter* 8: *Computational Issues in Stochastic Event Graphs.* Introduction. Monotonicity properties. Event graphs and branching processes. Markovian analysis. Appendix. Notes. PART V: POSTFACE. *Chapter* 9: *Related Topics and Open Ends.* Introduction. About realization theory. Control of discrete event systems. Brownian and diffusion decision processes. Evolution equations of general timed petri nets. Min-max systems. About cycle times in general petri nets. Notes. *Bibliography. Notation. Index.*

John L. Casti, Reality Rules: 1 Picturing the World in Mathematics. The Fundamentals (Wiley, New York, 1992) 388 pages

Chapter 1: *The Ways of Modelmaking: Natural Systems and Formal Mathematical Representations.* A theory of models. States, observables and natural systems. Equations of state. Equivalent descriptions and the fundamental question of modeling. Bifurcations and catastrophes. Complexity. Error and surprise. Formal systems. Modeling relations. *Chapter* 2: *Catastrophes, Dynamics and Life: The Singularities of Ecological and Natural Resource Systems.* The classification problem. Smooth functions and critical points. Structural stability and genericity. Morse's lemma and theorem. The splitting lemma and corank. Determinacy and codimension. Unfoldings. The Thom classification theorem. Electric power generation. Bifurcations and catastrophes. Harvesting processes. Estimation of catastrophe manifolds. Forest insect pest control. The catastrophe controversy. Mappings. Dynamical systems, flows and attractors. Bifurcation of vector fields. Stochastic stability and the classification of vector fields. *Chapter* 3: *Pattern and the emergence of Living forms: Cellular Automata and Discrete Dynamics.* Discrete dynamical systems. Cellular Automata: the basics. One-dimensional cellular automata. Local properties of one-dimensional automata. Global properties of one-dimensional automata. Algebraic properties of additive cellular automata. Languages: formal and natural. DNA sequences and cellular automata. L-systems and the growth of plants. The game of life. A cellular automation model of vertebrate skin patterns. Self-reproducing automata. Artificial life. Cellular automata—extensions and generalizations. *Chapter* 4: *Order in Chaos: Variety and Pattern in the Flow of Fluids, Population and Money.* The circle-10 system. Deterministic mechanisms and stochastic behavior. Quasi-periodic trajectories and the KAM theorem. A philosophical digression: Randomness and determinism in dynamical System Modeling. Scalar maps and the "Period-3" theorem. Snap-back repellors and multi-dimensional chaos. Tests for Chaos. Economic Chaos. Beer, bears, Bulls and chaos. Populations fluctuations. Continuous chaos and the Lorenz attractor. Poincaré maps and strange attractors. Chaos and the problem of turbulence. Turbulent behavior in the spread of disease. Self-similarity and fractals. Fractals and domains of attraction. *Index.*