Jump Linear Systems in Automatic Control
Michel Mariton
Marcel Dekker, Inc., New York, 1990, $99.75

This book is a monograph on hybrid parameter processes that are characterized by the presence of a discrete parameter and continuous variables. The author considers stochastic models in which the future control trajectories and the present solution do not determine completely the future of the system. The special stochastic processes and systems treated by the author are characterized by random transitions between different regimes, and this randomness primarily occurs through its discrete parameters. The book consists of eight chapters and two appendices. The appendices present summaries of basic probability, random processes, control optimization, jump linear quadratic regulators derived from maximum principles and dynamic programming, asymptotic behavior of quadratic regulators, suboptimal solutions, optimal switching output feedback, and algorithms for the optimization and evaluation of regulators for jump quadratic systems. The robustness, costs, and their distribution, bound costs, and minimax solutions of jump linear systems are treated in Chapter 4, while the jump linear quadratic Gaussian problem is analyzed in some detail with Kalman filtering and Poisson impulsive disturbances in Chapter 5. Optimal filtering, Wiener-driven oscillations, filter performance, and point-process observations are considered in Chapter 6.

Chapter 7 deals with control under regime uncertainty, stability, control optimization, and regime estimation filters. The final chapter, Chapter 8, considers extensions of hybrid systems, non-Markovian processes, wide-band hybrid models, and extensions of the jump linear systems presented in the previous seven chapters. The book contains many theorems and proofs, is well illustrated with examples, and covers the material in depth. It is relatively free of typographical errors except that pages 206 and 207 have been interchanged.

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