

Contents

Foreword	ix
Preface	xi
Acknowledgment	xiii
Adaptive Methods for Control Systems Design: An Overview	xv
Part I: Adaptive Control: General Introduction	1
Design of a Self-Optimizing Control System, <i>R. E. Kalman (Transactions of the ASME, February 1958)</i>	5
Adaptive System Design: A Genetic Approach, <i>K. De Jong (IEEE Transactions on Systems, Man, and Cybernetics, September 1980)</i>	16
Theory and Applications of Adaptive Control—A Survey, <i>K. J. Åström (Automatica, September 1983)</i>	25
Parameter Adaptive Control Algorithms—A Tutorial, <i>R. Isermann (Automatica September 1982)</i>	41
State-of-the-Art and Prospects of Adaptive Systems, <i>A. A. Voronov and V. Yu. Rutkovsky (Automatica, September 1984)</i>	57
Model Algorithmic Control (MAC); Basic Theoretical Properties, <i>R. Rouhani and R. K. Mehra (Automatica, July 1982)</i>	68
A New Solution to Adaptive Control, <i>J. M. Martin-Sanchez (Proceedings of the IEEE, August 1976)</i>	82
Optimality in Discrete Adaptive Systems, <i>Ya. Z. Tsympkin (Reprints of the 9th World Congress of the International Federation of Automatic Control, 1984)</i>	92
Global Stability of Adaptive Pole Placement Algorithms, <i>H. Elliott, R. Cristi, and M. Das (IEEE Transactions on Automatic Control, April 1985)</i>	96
Part II: Model Reference Adaptive Approach	105
Liapunov Redesign of Model Reference Adaptive Control Systems, <i>P. C. Parks (IEEE Transactions on Automatic Control, July 1966)</i>	109
Control of Unknown Plants in Reduced State Space, <i>P. N. Nikiforuk, M. M. Gupta, and H. H. Choe (IEEE Transactions on Automatic Control, October 1969)</i>	115
Comparative Studies of Model Reference Adaptive Control Systems, <i>C-C. Hang and P. C. Parks (IEEE Transactions on Automatic Control, October 1973)</i>	123
Model Reference Adaptive Control with an Augmented Error Signal, <i>R. V. Monopoli (IEEE Transactions on Automatic Control, October 1974)</i>	133
Unification of Discrete Time Explicit Model Reference Adaptive Control Designs, <i>I. D. Landau and R. Lozano (Automatica, July 1981)</i>	144
Stable Model Reference Adaptive Control in the Presence of Bounded Disturbances, <i>G. Kreisselmeier and K. S. Narendra (IEEE Transactions on Automatic Control, December 1982)</i>	163
Error Models for Stable Hybrid Adaptive Systems, <i>K. S. Narendra, I. H. Khalifa, and A. M. Annaswamy (IEEE Transactions on Automatic Control, April 1985)</i>	170
Part III: Self-Tuning Regulators	179
On Self Tuning Regulators, <i>K. J. Åström and B. Wittenmark (Automatica, March 1973)</i>	181
Self-Tuning Control, <i>D. W. Clarke and P. J. Gawthrop (Proceedings of the IEEE, June 1979)</i>	195
Self-Tuning Regulators for a Class of Multivariable Systems, <i>U. Borison (Automatica, March 1979)</i>	203
Self-Tuning Controllers Based on Pole-Zero Placement, <i>K. J. Åström and B. Wittenmark (Proceedings of the IEE, May 1980)</i>	210
Multivariable Pole-Assignment Self-Tuning Regulators, <i>D. L. Prager and P. E. Wellstead (Proceedings of the IEE, vol. 128, Part D, pp. 9-18, Jan. 1981)</i>	221
Predicator-Based Self-Tuning Control, <i>V. Peterka (Automatica, January 1984)</i>	231

Practical Issues in the Implementation of Self-Tuning Control, <i>B. Wittenmark and K. J. Åström (Automatica, September 1984)</i>	243
Part IV: Adaptive Control of Uncertain Plants	255
Dual-Control Theory. I, <i>A. A. Fel'dbaum (Avtomtika i Telemekhanika, 1960)</i>	257
Actively Adaptive Control for Nonlinear Stochastic Systems, <i>E. Tse and Y. Bar-Shalom (Proceedings of the IEEE, August 1976)</i>	264
Adaptive Stochastic Control for a Class of Linear Systems, <i>E. Tse and M. Athans (IEEE Transactions on Automatic Control, February 1972)</i>	274
Adaptive Control with the Stochastic Approximation Algorithm: Geometry and Convergence, <i>A. H. Becker, Jr., P. R. Kumar, and C-Z. Wei (IEEE Transactions on Automatic Control, April, 1985)</i>	288
The Strong Consistency of the Stochastic Gradient Algorithm of Adaptive Control, <i>H. F. Chen and P. E. Caines (Proceedings of the 23rd IEEE Conference on Decision and Control, 1984)</i>	297
Stochastic Adaptive Control for Exponentially Convergent Time-Varying Systems, <i>G. C. Goodwin, D. J. Hill, and X. Xianya (Proceedings of the 23rd IEEE Conference on Decision and Control, 1984)</i>	301
Part V: Applications to Aircraft Control Problems	307
Stability Analysis and Design for Aircraft Gust Alleviation Control, <i>P. N. Nikiforuk, M. M. Gupta, and K. Kanai (Automatica, September 1974)</i>	309
Gust-Alleviation Control Systems for Aircraft, <i>D. McLean (Proceedings of the IEE, July 1978)</i>	320
Design of a Two-Level Adaptive Flight Control System, <i>P. N. Nikiforuk, H. Ohta, and M. M. Gupta (Journal of Guidance and Control, January/February 1979)</i>	331
Command and Stability Systems for Aircraft: A New Digital Adaptive Approach, <i>U. Hartmann and V. Krebs (Automatica, March 1980)</i>	338
Part VI: Applications to Autopilots	351
Adaptive Autopilots for Tankers, <i>C. G. Källström, K. J. Åström, N. E. Thorell, J. Eriksson, and L. Sten (Automatica, May 1979)</i>	353
Adaptive Steering of Ships—A Model Reference Approach, <i>J. Van Amerongen (Automatica, January 1984)</i>	367
Part VII: Applications to Process Control, Robotics and Other Fields	379
Successful Adaptive Control of Paper Machines, <i>T. Cegrell and T. Hedqvist (Automatica, January 1975)</i>	381
Self-Tuning Control of an Ore Crusher, <i>U. Borison and R. Syding (Automatica, January 1976)</i>	388
Self-Tuning Control of a Titanium Dioxide Kiln, <i>G. A. Dumont and P. R. Bélanger (IEEE Transactions on Automatic Control, August 1978)</i>	395
Self-Tuning Adaptive Control of Cement Raw Material Blending, <i>L. Keviczky, J. Hetthéssy, M. Hilger, and J. Kolostori (Automatica, November 1978)</i>	402
Adaptive Identification and Control Algorithms for Nonlinear Bacterial Growth Systems, <i>D. Dochain and G. Bastin (Automatica, September 1984)</i>	410
Model Reference Adaptive Control Algorithms for Industrial Robots, <i>S. Nicosia and P. Tomei (Automatica, September 1984)</i>	424
Adaptive Locomotion of a Multilegged Robot over Rough Terrain, <i>R. B. McGhee and G. I. Iswandhi (IEEE Transactions on Systems, Man, and Cybernetics, April 1979)</i>	434
Adaptive Control of Left Ventricular Bypass Assist Devices, <i>B. C. McInnis, Z-W. Guo, P. C. Lu, and J-C. Wang (IEEE Transactions on Automatic Control, April 1985)</i>	441
Adaptive Load-Frequency Control of the Hungarian Power System, <i>I. Vajk, M. Vajta, L. Keviczky, R. Haber, J. Hetthéssy, and K. Kovács (Automatica March 1985)</i>	449
Author Index	459
Subject Index	461
Editor's Biography	463