Book Announcements

SKOWRONSKI, J.M., *Applied Liapunov Dynamics,* Systems and Control Engineering Consultants, Brisbane, 1984, 590 pages.

Purpose: This book is meant to be a self-learning and thought provoking reference text on nonlinear and nonlinearizable physical system dynamics.

Contents: Structures in system dynamics. Lumped model. Symplectic physical model. Energy flows. Review of the Liapunov formalism. Autonomous systems. Kinetic synthesis.

PANG, G.K.H., University of Waterloo, and **MACFARLANE, A.G.J.**, University of Cambridge, *An Expert Systems Approach to Computer-Aided Design of Multivariable Systems,* Springer-Verlag, New York, 1987, 325 pages, $30.00.

Purpose: The work presented here is concerned with the investigation of expert system techniques for the design of linear multivariable feedback control systems. The book is intended mainly for researchers in the field.

Contents: Introduction. Use of expert systems for control system design. Indicators of stability, performance and robustness. The primary indicators for interactive design. Simple design technique. Reverse frame alignment design technique. An observer-based approach to design. Development of an expert system for multivariable control system design using a systematic design approach. Conclusions. Appendices. References. Index.

KOKOTOVIC, P., University of Illinois, **BENSOUSSAN, A.**, University of Paris Dauphine, **BLANKENSHIP, G.**, University of Maryland, Editors, *Singular Perturbations and Asymptotic Analysis in Control Systems,* Springer-Verlag, New York, 1987, 417 pages, $52.20.

Purpose: This collection of papers deals with the general role of singular perturbation techniques in control systems analysis and design problems. This book is intended primarily for researchers in the field.

Contents: Singular perturbation techniques in control theory (P. Kokotovic). Singular perturbations for deterministic control problems (A. Bensoussan). Singular perturbations in stochastic control (A. Bensoussan, G. Blankenship). Singular perturbations of Markov chains (F. Delebecque, O. Muron, J. Quadrat). Optimal control of perturbed Markov chains (J. Quadrat). Time scale modeling of dynamic networks with sparse and weak connections (J. Chow, P. Kokotovic). Stability analysis of singularly perturbed systems (H. Khalil). New stability theorems for averaging and their application to the convergence analysis of adaptive identification and control schemes (L. Fu, M. Bodson, S. Sastry).

BULIRSCH, R., Technische Universitat Munchen, **MIELE, A.**, Rice University, **STOER, J.**, Universitat Wurzburg, and **WELL, K.**, DFLVR, Editors, *Optimal Control,* Springer-Verlag, New York, 1987, 328 pages.

Purpose: This text is the proceedings of the Conference on Optimal Control and Variational Calculus held at Oberwolfach, West Germany, in June, 1986.

Contents: Singular perturbations and asymptotic expansions in nonlinear optimal control (M. Ardema). Reduction of deterministic differential games to problems of optimation (C. Marchal). Limit cycles in economic control models (G. Feichtinger). An approach to control theory by fixed point algorithms (K. Schilling). Numerical solution of an optimal control problem with hysteresis (M. Brokate). Comparison between several conjugation concepts (K. Elster, A. Wolf). Optimal control with initial states not a priori given and boundary conditions involving delay (A. Kowalewski). Sensitivity and optimal control of elastic structures with distributed parameters (G. Szefer). Computational strategies for the tension parameters of the exponential spline (P. Rentrop, U. Wever). Aircraft minimum time to climb model comparison (B. Pierson, S. Ong). Aircraft trajectory optimization by curvature control (R. Walden). Oscillatory cruise—a perspective (J. Breakwell). A planar intercept problem with a chattering junction of nonsingular and singular subarcs (K. Schnepper). On the synthesis of optimal nonlinear feedback laws (H. Bourdache-Siguerdidjane). Direct and indirect approach for real-time optimization of flight paths (W. Grimm, P. Hiltman). Topics in fixed order controller design (R. Longman). Nonlinear system analysis by direct collocation (D. Kraft). Control of a robot manipulator on a prescribed path subject to optimization conditions and additional constraints (U. Leiner). Numerical computation of singular control functions for a two-link robot arm (H.J. Oberle). Decentralized control for an uncertain multi-reach river system (G. Leitmann, C.S. Lee, Y.H. Chen). A new approach for optimizing hydropower system operation with a quadratic model (S.A. Soliman, Christensen). Some problems associated with the control of distributed structures (L. Meirovitch). Optimal control of a distributed system (J.A. Burns, E.M. Cliff). Optimale gestaltung von elastischen balken (L. Mikulski).

SOLOMON, F., State University of New York–Purchase, *Probability and Stochastic Processes,* Prentice-Hall, Englewood Cliffs, 1987, 426 pages.

Purpose: This text is designed for a one-semester or two-quarter course in probability theory and its applications. Computation is included in two forms: the calculation of formulas and the simulation of random models. Differential and integral calculus are prerequisites for this material.

Contents: Introduction. The language and axioms of probability. Combinatorics. Conditional probability and independence. Discrete random variables. Continuous random variables. The Poisson distribution and the Poisson process. Interlude: modeling randomness. Joint probability distributions. Variances, covariances, correlation coefficients, and more on expectations. The normal distribution, central limit theorem, and law or large numbers. Continuous-time birth and death processes. Discrete-time markov chains. Bibliography. Appendices, Index.

MADAY, C., North Carolina University, *Computer-Aided Design of Feedback Control Systems for Time Response,* Instrument Society of America, Research Triangle Park, 1987, 124 pages.

Contents: Introduction. The integral error with state feedback method. Saturation operation with linear feedback. Interaction and noninteraction in multi-input, multi-output systems. Pole assignment in hybrid analog/discrete systems. The reduced-order error observer. Appendix.