117 Improvement of Transient Response by Means of Variable Setpoint Weighting
C.C. Hang, L.S. Cao, pp 525-528

A new approach is introduced for speeding up the transient set-point of a process controller by adapting the set-point weighting factor according to both the error and the measurable dynamic characteristics of the process For a PID controller, the initial set-point weighting factor, the times at which this factor should be varied, and the adapted value of the set-point weighting factor, are all given by a set of correlation formulae which can be used in conjunction with the refined Z-N formulae Analysis has also led to an equivalent block diagram, more suitable for implementation as set-point filtering with a variable zero

118 Output Overshoot and Pole-Zero Configuration
H. Kobayashi, pp 529-532

It is well known that step responses of linear systems are perfectly characterized by their own poles and zeros In this paper, the author attempts to derive clear relations between pole-zero configuration and overshoots He also gives a quantitative estimation of its magnitude with respect to a given pole-zero configuration

119 Control System Design Using Transmission Zero Assignment
R.V. Patel, H. Geniele, K Khorasani, pp 533-536

This paper considers the problem of designing output feedback controllers for tracking and disturbance rejection in a nonminimum-phase linear time-invariant system The problem is solved using some recent techniques for transmission zero assignment. Several methods are compared via an application involving the tip position control of a flexible link

120 Discrete Transfer-Function Zeros and Step-Response Extrema
M. El-Khoury, O.D. Crisalle, R. Longchamp, pp 537-542

A new general building theorem for the number of extrema that may occur in the step-response of a stable linear discrete system is applicable to stable systems with real zeros and real poles Upper and lower bounds on the number of extrema are easily computed. The lower bound reflects the fact that zeros in the region of convergence always cause extrema Zeros of type M_3, defined as those located between the fastest and the slowest poles, can also produce extrema which always appear in a *wave* pattern consisting of a pair of consecutive extrema. Sufficient conditions for extrema-free response are established The results are verified using a numerical example

121 Synthesis of Compensators for Robust Non-Overshooting Step Responses in Uncertain, Minimum Phase, Plants
Jay-Wook Song, Suhada Jayasuriya, pp 543-546

Synthesis of a compensator that results in a non-overshooting step response has long been neglected in the feedback control area. This paper presents a design method for synthesizing such compensators for SISO, stable and minimum-phase plants with significant plant variations The essential idea behind the technique is to appropriately locate the closed-loop poles with respect to the fixed zeros of the plant and some added zeros, while preserving important feedback issues such as sensitivity reduction and disturbance rejection. The design methodology is a frequency domain one in which loop-shaping plays a key role An example is included to illustrate the design procedure

122 Feedforward Controllers for Perfect Tracking that does not Invert Plant Zeros Outside the Unit Disc
S. Jayasuriya, M. Tomizuka, pp 547-550

This paper considers synthesizing feedforward controllers for the explicit purpose of assuring perfect tracking (in the absence of plant uncertainty) of a prespecified class of time-varying signals The proposed technique cancels all the closed-loop poles and only the minimum-phase zeros Non-minimum phase zeros are taken into account in a unique way These results complement the notion of zero phase error tracking (ZPET) introduced by Tomizuka (1987) A complete formulation of the problem in the discrete-time domain for the perfect model case is given. Also formulated is a robust version of the problem statement The latter is accomplished by embedding the controller synthesis in a standard two-degree-of-freedom configuration

123 High Performance Computing in Linear Control
Biswa Nath Datta, Karabi Datta, pp 551-558

This paper postulates that advances in the use of high-performance computation in control engineering are lagging behind those in both control theory and applications It presents an overview of some new, computationally viable parallel algorithms, also, algorithms for large-scale computations for important linear algebra problems arising in control Among these are problems of controllability, the eigenvalue assignment problem, design of observers, and matrix equations Particular attention is given to block algorithms for high-performance computing The results, performed on existing parallel/vector architectures, are presented The paper concludes with remarks on future directions of research on high-performance computing for control

124 Convergence of Numerical Method for Multistate Stochastic Dynamic Programming
F.B. Hanson, K. Naimipour, pp 559-562

Convergence of corrections is examined for a predictor-corrector method to solve Bellman equations of multi-state stochastic optimal control in continuous time Quadratic costs and constrained control are assumed A heuristically linearized comparison equation makes the nonlinear, discontinuous Bellman equation amenable to linear convergence analysis Convergence is studied using the Fourier stability method A uniform mesh ratio-type condition for the convergence results The results are valid for both Gaussian- and Poisson-type stochastic noise The convergence criteria have been extremely useful for solving the larger multi-state problems on vector supercomputers and massively parallel processors

125 Numerical Issues in Computing the Stable Deflating Subspace of a Symplectic Pencil
R V. Patel, pp 563-566

Some numerical issues in computing a basis for the stable deflating subspace of a symplectic pencil are addressed. Such a basis is required when solving the discrete-time algebraic Riccati equation using the generalized Schur vector approach An algorithm based on certain properties of the symplectic pencil is proposed as a viable alternative to the conventional approach. The algorithm is based on a recent method for computing the eigenvalues of a symplectic pencil, and uses only orthogonal transformations

126 Recent Applications of Symbolic Computation in Control System Design
D W.C Ho, J Lam, S K. Tin, C Y. Han, pp 567-570

This paper describes several recent applications of symbolic computation to control system design based on MACSYMA These include routines to calculate the transfer function of a control system in block-diagram representation and to compute and simplify state-space realizations of multivariable control systems The programs provide a quick way to formulate design problems and automate the calculation in the initial stage of a control system design process An example on the application of these routines in the setting up of generalized plant state space realization of use in H_∞/H_2 optimal control is provided

127 Specification of a Real-Time Knowledge Based Supervision System
B. Bergeon, A Zolghadri, Z Benzian, J.L. Ermine, M Monsion, pp 571-576

This paper proposes a hierarchical structure for the supervision of an industrial process The general frame for the specification of the knowledge base is presented through the specific example of a supervision system for the robust control of a robot The role devoted to the supervision system lies in the surveillance of a few indexes of good functioning of the path-planner, the robust controller and the electro-mechanical plant. After detection, analysis and diagnosis of a failure situation, the supervision layer decides to set off appropriate actions such as readjustment of the path-planner design parameters, either self-tuning of robust controller through an identification phase, or switching to a different operating mode