

Dynamic Programming in Chemical Engineering and Process Control, Sanford M. Roberts, Academic Press, New York (1964).

The techniques for optimization of steady state or transient chemical engineering processes or systems are currently receiving attention because of the economic advantages associated with the implied improved operations. One such technique, as developed originally by Bellman, is dynamic programming. While the basic concepts of dynamic programming are quite simple, that is, the principle of optimality and the resulting functional equations, the implementation of the same to complex processes is more difficult to ascertain. Thus, in the current text the author spends a chapter developing the concepts to be used and then, in subsequent chapters, applies these to an endless variety of different topics and systems. For example, consideration is given to equipment replacement, catalyst replacement, and feed allocation to multiple reactors; to control of chemical reactors, feedback control systems, and cascaded tank optimization. In each case the problem is developed in a logical and concise manner and carried out to the end resulting optimum condition. Many other topics in the areas of allocation, inventory, and stochastic processes are also included.

In addition, there are extensive problems at the end of each chapter to extend the scope of the text material. These problems also make use of suitable references in the literature.

Of significant interest to the user of dynamic programming is the chapter on computational aspects where the implementation of the technique is given careful attention. Here the author gives the best discussion seen by this reviewer on the so-called *dimensionality problem of dynamic programming*; methods such as approximation in policy space, function space, linearization, and polynomial approximation are all developed. This reviewer would have liked a careful comparison of the feasibility of these different methods, but such was not forthcoming.

This book should be welcomed by many research chemical engineers and by academic people as an excellent text for a first-year graduate course. The printing is excellent and the references include some papers from as late as 1963. All in all, this is a fine book in an area of continuously increasing interest to chemical engineers.

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(Continued on page 595)

Semibatch Operation of a Recirculation Reactor for the Hydrogenation of Ethylene <i>J. P. Leinroth, Jr., and T. K. Sherwood</i>	524
The Effect of Surface Tension on Factors in Boiling Heat Transfer <i>John B. Roll and John E. Myers</i>	530
Solution of the Equations of Change by Galerkin's Method <i>L. J. Snyder, T. W. Spriggs, and W. E. Stewart</i>	535
Turbulent Film Condensation	Jon Lee 540
Prediction of Efficiencies and Mass Transfer on a Stage with Multicomponent Systems	H. L. Toor 545
Application of Benedict-Webb-Rubin Equation of State to Hydrogen Sulfide-Hydrocarbon Mixtures	Ralph Simon and James E. Briggs 548
Numerical and Experimental Study of Damped Oscillating Manometers: II. Non-Newtonian Fluids	John C. Biery 551
Joule-Thomson Effects for Nitrogen-Ethane Mixtures <i>A. L. Stockett and L. A. Wenzel</i>	557
Monte Carlo Solution of Radiant Heat Transfer in a Nongrey Nonisothermal Gas with Temperature Dependent Properties	John R. Howell and Morris Perlmutter 562
Kinetics of the Catalytic Oxidation of Sulfur Dioxide <i>Burton Davidson and George Thodos</i>	568
A Kinetic Study of Sulfur Dioxide in Aqueous Solution with Radioactive Tracers <i>J. C. Wang and D. M. Himmelblau</i>	574
Heat Transfer Coefficients for a Hot Gas Oscillating at High Amplitudes in a Cylindrical Chamber	M. D. Horton, J. L. Eisel, and G. L. Dehority 580
Communications to the Editor	
An Example of the Use of Combined Models: Mixing in a Tubular Reactor with Return Bends	Kenneth B. Bischoff 584
Kihara and Lennard-Jones Parameters for the Isomeric Hexanes <i>Richard G. Griskey, Siu Yuen Fok, and Charles W. Stuewe</i>	584
The Relationship between the Froude and Reynolds Numbers in Falling Vertical Films	Stanislaw Portalski 584
Evaluation of Optimal Control Strategies	John E. Cotter 585
Comments on the Above Communication to the Editor	Leon Lapidus 585
Measurements of Slip Velocity in Two-Phase Mercury Flows <i>C. R. Smith, Y. S. Tang, and C. L. Walker</i>	586
Information Retrieval	588
Errata	597