Abstracts

Of the latest book in the Chemical Engineering Progress Symposium Series

PROCESS DYNAMICS AND CONTROL

Vol. 57, No. 36, 1961, $4.00 to members, $15.00 to nonmembers. Symposium Series books may be ordered from the Secretary's Office, the American Institute of Chemical Engineers, 345 East 47 Street, New York 17, New York.

The Dynamics and Control of Distillation Units and Other Mass Transfer Equipment, David H. Archer and Robert R. Rothfus. Two basically different sets of equations describing the dynamic behavior of mass transfer equipment are discussed. They depend on whether the process occurs by a series of equilibrium stages (for example distillation in a plate column or extraction in a series of mixer-settler stages) or by a continuous-rate process (for example distillation in a packed column or absorption on a spray tower). **A Survey of the Literature on Heat Exchanger Dynamics and Control,** Theodore J. Williams and Henry J. Morris. This paper evaluates the current literature on dynamics and control of heat exchangers. It investigates the sources of disagreement to determine the direction which future projects in this field should take. **On the Dynamics of Chemical Reactors,** Leon Lapidus. This article reviews the current status and possible future directions for simulating the dynamic behavior of chemical reactors. Implicit in the discussion is the assumption that the chemical kinetics of the reaction system are known or can be estimated accurately. **The Mobile Data Logger—Requirements for its Design and Use,** P. E. A. Cowley and D. E. Johnson. The evaluation of mobile plant data-gathering equipment from a two-channel analogue to a twenty-channel analogue and digital facility is described. Primary emphasis is placed on the factors that dictated the choice of equipment, how the equipment has been used, and what features would be incorporated in future equipment. **Mobile Data Loggers,** J. F. Draffen, J. B. Jansen, and M. O. Bird. General-purpose units incorporating magnetic tape recording and digital computer analysis aid process investigations. **Transient vs. Frequency Response in Analyzing Chemical Process Systems,** N. H. Ceaglske. This paper is a general discussion of the techniques for the determination of process parameters by transient and frequency-response methods. The advantages and disadvantages of the several methods are given, and the design of control systems is covered briefly. **Some Practical Limitations of Correlation Techniques in Determining Process Frequency Response,** Paul W. Gallier, C. M. Sliepcevich, and T. H. Puckett. It has been demonstrated that the correlation method can be used to find frequency-response functions approximately within the limit of the experimental accuracy of other measurements when proper numerical techniques are used and the input correlation functions are known. This method has been shown to be applicable to either one or two input variables for the case where the two input variables are uncorrelated with each other. **The Moments Method of Analysis and its Application to Mixing Dynamics,** R. E. Otto and L. E. Stout, Jr. The relations between the moments of the input and output time distributions of a linear system are presented, and its application to the dynamic description of a mixing vessel is described. **Pulse Testing Method,** Joel O. Hougen and Robert A. Walsh. Pulse testing procedures are shown to be useful in dynamic analysis across-the-board from the components to the complete plant. **Distributed Parameter Process Dynamics,** William C. Cohen and Ernest F. Johnson. The methods employed in this paper to determine the dynamic characteristics of the double pipe heat exchanger are valid and simple. They can be used profitably to examine typical processes in the chemical industry. **Chemical Process Control in the Presence of Both Transport Lag and Sampled Data Control,** Hyung S. Min and Theodore J. Williams. Future process control systems will undoubtedly include instruments for the analysis of multicomponent streams. Since these instruments also universally operate as sampled-data devices with an associated dead time to permit the analysis to be made, it is imperative that the effects of such conditions on process and reactor control be investigated. This paper reports the results of an extensive study of these effects by means of analogue computer simulation. **The Dynamical Behavior of Stirred Tanks,** George R. Marr, Jr., and Ernest F. Johnson. A mathematical model describing the dynamical behavior of stirred tanks is presented. It is shown that the model applies to batch and continuous-flow stirred tanks. **Dynamics of Heat Removal from a Jacketed Agitated Vessel,** W. S. Stewart, C. M. Sliepcevich, and T. H. Puckett. The purpose of this investigation is to study the dynamic heat transfer characteristic of a jacketed, agitated vessel from which the heat is removed by utilizing the heat of vaporization of a volatile coolant, boiling in the jacket of the vessel. **Latest Techniques in the Analysis of Kinetic Systems,** Leon Lapidus. In this paper a kinetic system is taken as a suitable reactor within which the chemical reaction is occurring. **Dynamic Characteristics and Analogue Simulation of Distillation Columns,** D. E. Lamb, R. L. Pigford, and D. W. T. Rippin. Frequency response and transient behavior of plate types of distillation columns have been represented by linear small perturbation types of equations, with the curved vapor-liquid equilibrium relationship taken into account. **Experimental Transient Response of a Pilot Plant Distillation Column,** M. F. Baber, L. L. Edwards, Jr., W. T. Harper, Jr., M. D. Witte, and J. A. Gerster. Experimental transient response data are presented for a five-tray, 2-ft. diameter, bubble cap distillation column when a sudden change in composition is introduced in the reflux stream to the top tray. **Status of Physical Property Measurement Instrumentation in Fast Response Applications,** V. A. Lauher and T. J. Williams. This paper is a comprehensive listing of high-speed instruments available at the present time. Included are response times and functional use where these could be obtained. **Some Special Purpose Computers and Their Use in Data Gathering and Analysis,** John F. Pink. For convenience the author has selected a few general application categories of computers as they are used to gather and use data: control and optimizing, system simulation and control, statistical simulation and analysis, economies with large digital computers, and special data analysis.