# WHAT THEY'RE USING

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**PROCESS SYSTEMS ANALYSIS AND CONTROL**, by Donald R. Coughanowr and Lowell B. Koppel, both associate professors of chemical engineering at Purdue University: McGraw-Hill Book Company, New York, 1965. xii and 491 pages. $15.50.

This book was used at Iowa State University in the fall of 1965 for a process control course for all seniors in chemical engineering. It is the most satisfactory text we know of for such a course. The book is well written, in language suitable to its intended audience. In addition, it provides rather more complete coverage of linear systems analysis than preceding books intended for a similar audience. The only major weakness of the book is in the area of application of the theory to actual problems in the control of chemical plant.

The authors have done a good job of explaining the standard mathematical tools of linear systems analysis in simple language. An introduction to ordinary differential equations and some acquaintance with complex numbers are sufficient mathematical background for most of the text. Unfortunately, the necessity to limit the methematical level occasionally makes the book a bit clumsy. For example, the Bode stability criterion is introduced by heuristic arguments rather than as a special case of the Nyquist stability criterion. Also, the Routh test for positive roots is used rather often, but never proven.

The book is well organized for use as a text. There is considerable freedom available to an instructor in the selection of material and the order of presentation. For instance, it would be possible to emphasize either frequency-response or root-locus methods, which are covered independently in some detail. Also, the book is surprisingly free from errors and misprints.

The weakest feature of the book is the lack of information on actual applications of linear systems analysis to real problems in industrial chemical systems process control. This is not caused by lack of effort on the part of the authors. In general, such information is just not available in the open literature. But the lack of adequate information on real control systems makes much of the theory unconvincing to the typical undergraduate student in chemical engineering. The applications that are discussed in the text nearly all show how the theory *might* be applied, rather than showing how the theory *does* apply in industrial practice to the control of chemical plant.

We would not suggest the use of this book at the graduate level, because some important topics are omitted and because the mathematical treatment is limited. For example, computer control is not discussed and such techniques as the maximum principle of Pontryagin or the method of Liapunov are not included.

In summary, this is a good book for an undergraduate course in process systems analysis for chemical engineers. The authors have made a significant contribution by explaining the standard tools of linear systems analysis and some potential applications in language that an undergraduate chemical engineering student will understand. A better book is still needed that will, in addition show how the theory actually is applied to the solution of real problems in the control of industrial chemical plant.