

standard pH measurement.

Radioactive waste disposal was handled by Westinghouse and a representative of United States Steel Corporation gave an excellent treatment of the steel industries problems and programs. The municipal waste and their ability and willingness to handle industrial discharge was presented by the county's municipal disposal facility, ALCOSAN. Jones and Laughlin Steel Corporation presented the coal mining waste problem and treatment. Effective treatment can be inacted on new mines; but old abandoned ones are the areas most difficult to clean-up.

THERMAL POLLUTION

DURING THE LAST WEEK of the course, the thermal pollution area was treated with consideration from power plants both coal fired and atomic. Much of the atomic power plant material tied in with the radioactive waste treatment lecture.

BOOK REVIEW: Multivariable Computer Control

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publish these together in a single volume. The result is the present book.

The authors have been able to present a coherent view of their work by appending introductory discussion to previously published papers and organizing this by topic. It may be useful to summarize briefly the scope of the material. Section 1 presents an overall view of the book, while Section 2 treats several different approaches to modelling the process. Of particular interest is a comparison of model reduction procedures and a study of several approximate low order models of the process. Section 3 demonstrates the dynamic performance to be expected under conventional control while Sections 4-6 discuss more modern computer control techniques. These sections present a detailed comparative study of techniques such as multivariable feedback control, combined feedforward-feedback control, time optimal control, optimal linear-quadratic feedback control, model reference adaptive control, etc. Section 7 presents experimental testing of on-line state estimation (using Kalman Filters) and the incorporation of the state estimator into a stochastic feedback control scheme. Finally Section 8 describes the overall educational aspects of such computer control facilities.

In short, reliance on industry for up-to-date information and a special viewpoint was very successful both in the atmospheric and industrial wastes courses offered. Our area indeed is rich in capable, knowledgeable engineers willing to assist in the preparation of meaningful courses on the environment for the students of our engineering schools. □

REFERENCES

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3. Ledbetter, J. E., *Air Pollution Part A: Analysis*, Marcel Dekker, Inc., New York (1972).
4. National Air Pollution Control Administration Publications AP-49, 50, 51, 52, 62, 63, 66, 67, 68, 84.
5. Nemerow, N. L., *Liquid Waste of Industry*, Addison-Wesley Publishing Co., Reading, Mass. (1971).
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The case study would be of interest to anyone wanting to evaluate the experimental performance of a number of modern process control techniques. However, as one who has used this case study (in manuscript form) with good results in a graduate process control course, this writer feels the greatest value of the book is as a supplementary text in such a graduate course. The availability of a single process from which to draw experimental examples of model linearization, model reduction, single loop feedback control, multivariable feedback control, multivariable optimal feedback control, state estimation, etc., allows the student to study a new method on an already familiar process and to compare with methods already discussed. As a supplement to lectures over the fundamental mathematical methods, we found the case study extraordinarily helpful.

BOOK RECEIVED

Organic Electronic Spectral Data. Vol. II, 1969.

Edited by J. P. Phillips, H. Feuer, P. M. Laughton and B. S. Thyagarajan.

John Wiley & Sons, Inc. New York, 1975.

1075 pages.

This is volume II in a continuing compilation of ultraviolet-visible spectra of organic compounds presented in the journal literature.