

## BOOK REVIEWS

*Correspondence concerning reviews should be addressed to the Book Review Editor, Professor William Kruskal, Department of Statistics, University of Chicago, Chicago 37, Illinois.*

P. WHITTLE, *Prediction and Regulation by Linear Least-squares Methods*. English Universities Press, London, and Van Nostrand, Princeton, 1963. 25s or \$3.75 x + 147 pp.

Review by FREDERICK J. BEUTLER<sup>1</sup>

*University of Michigan*

The theory of linear least square error prediction (l.l.s.p.) for wide-sense stationary sequences and processes was developed, almost simultaneously, by Wiener and Kolmogorov. The former emphasized the role of spectral factorization, while the latter placed l.l.s.p. in its natural context of Hilbert spaces and functions of Hardy classes. With this beginning, l.l.s.p. achieved maturity almost at its very inception.

Those wishing to master the theory may turn to the books of Doob [2] or Grenander and Rosenblatt [3], both of which present l.l.s.p. in rigorous fashion. These references, however, lack examples, contain little material on combined filtering and prediction, and make no concessions to weaknesses in the reader's mathematical training. Consequently, many people interested principally in applications of l.l.s.p. would prefer to avail themselves of other sources.

The engineer, in particular, has recourse to many texts purporting to treat systems with random inputs. More often than not, he will find that the analysis consists of a series of implausible computational steps that finally yield—mirabile dictu—Wiener's formula (see e.g. [4]).

Between the two approaches mentioned above there lies a middle ground that has been incompletely exploited. If certain assumptions are made on the spectra of the processes involved, much of l.l.s.p. and filtering theory can be presented satisfactorily to those of modest mathematical attainment. An expository treatment along these lines, supplemented with more recent contributions, and illustrated by examples drawn from a diversity of fields, should find a large and interested audience.

Whittle's book is one of few (cf. [6]) that attempts to meet this need, and more. The classical l.l.s.p. and filtering theory is presented, of course, but there is also material on multivariate prediction, interpolation, unbiased l.l.s.p. of processes containing deterministic components with unknown parameters, l.l.s.p. for some non-stationary processes, and finally, linear least square error regulation (feedback control).

The text—for such it is meant to be—is a sound and sober account of those facts on the above topics that can be presented at an intermediate level, and

<sup>1</sup> Now a Visiting Scholar, University of California, Berkeley.