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Book Review: *Principles of Radiophysics*

Principles of Radiophysics. Vol. 1: **Elements of Random Process Theory** (1987). Vol. 2: **Correlation Theory of Random Process** (1988). S. M. Rytov, Yu. A. Kravtsov, and V. I. Tatarskii. Springer-Verlag, New York.

The two volumes being reviewed are English translations of a much earlier Russian version of this text with two more volumes remaining to be issued. The first volume is a general introduction to probabilistic methods, emphasizing those that a physicist or electrical engineer might find useful.

While there is material in Vol. 1 that is interesting, I found it to be less carefully written than the texts by Gardiner or van Kampen and somewhat old-fashioned in tone. For example, the chapter on stochastic differential equations contains little more than the Langevin treatment, with only a bare mention of systematic developments of the theory by Ito and Stratonovich. The chapter on Markov processes does not have material related to spectral expansions of the solution, and very little on asymptotic properties of these processes. First-passage-time problems for Markov processes rate a bare five pages. On the other hand, there are a number of interesting applications of the methodology related to the author's own research interests. For example, there are useful but short discussions of the refraction of a light ray in a disordered medium and of the Rice–Nakagami distributions, which are much used in the analysis of radioastronomy data. Both Rytov and Tatarskii have substantially contributed to this general research area. Other material does not get quite the same authoritative treatment. Each chapter of the two volumes concludes with a number of worked examples. The translation is not entirely smooth, and there are a number of typos.

Volume 2 contains more in the way of material related to radio-astronomical experiments. This includes a discussion of the notion of coherence in general, with particular application to interferometry and the Brown–Twiss experiments. Other topics covered in this volume will be of interest to electrical engineers. Some of these are: the notion of complex

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822/55/5-6-30

signals, the analysis of random pulse trains, and techniques making use of Fourier representations for the solution of noise problems.

In summary, I do not believe that the volumes that have appeared give the best introduction to probability for statistical physicists, in spite of having some interesting material of a specialized nature. The remaining two volumes may be more in the nature of a monograph, and may therefore be of greater interest.

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