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Stationary stochastic processes for scientists and engineers.

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This book presents an introduction book to time series analysis. As mentioned by the authors, it is suitable for a one-semester course. It is a well-written and easy to read book which is illustrated by lots of examples. The book is mainly intended for students in science and engineering, but it is also a good source of information for researchers who want to learn about time series analysis. The book contains nine chapters, five appendices, 60 references and an index. The first chapter is an introductory chapter about stochastic processes. It starts with 11 examples of stochastic processes in science and engineering. After this, the definition of stochastic processes is given. The chapter ends with the definition of the distribution of a stochastic process. In the second chapter, the authors introduce stationary processes and consider some of their properties. The authors focus their attention on moment functions. Special attention is paid to the covariance function which represents a measure of linear dependence, and to the cross-correlation function which represents a measure of dependence between two different stochastic processes. Some special cases of stationary processes, such as strictly and weakly stationary processes, and ergodic processes are briefly considered. At the end of this chapter, estimations of some moment functions, such as the mean value and the covariance function, are discussed, and simulation results based on the Monte-Carlo method are provided. The third chapter deals with the Poisson process. The authors provide two equivalent definitions of this process: the counting definition and the arrival time definition. As the Poisson process is a special case of processes with stationary independent increments, more details about this general class of stochastic processes are provided. The Monte-Carlo simulations of the homogeneous and inhomogeneous Poisson processes are discussed at the end of this chapter. Chapter 4 is devoted to the spectral decomposition of the covariance function of a time series. Chapter 5 deals with a special case of stochastic processes, the so-called Gaussian processes, whose finite-dimensional distributions are normal, and their properties are briefly discussed. This chapter concludes with two generalized families of processes, the Lévy processes and the shot noise processes. Linear systems and linear filters are introduced and discussed in Chapter 6. Autoregressive and moving average models as basic elements in time series analysis are described in Chapter 7. Also, in this chapter, two important issues of time series analysis, the estimation of the unknown parameters and the prediction in these models are discussed in more detail. The last two chapters are about the applications of linear filters and about frequency analysis and spectral estimation. *Miroslav M. Ristić (Niš)*

Classification: K65
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