

Postscript

In this book, we have been concerned above all with the constant interplay between time and frequency domain descriptions of signals and systems, which is perhaps the main hallmark of signal analysis and linear signal processing. An attempt has been made to fit random waveforms into the same general framework as deterministic ones, and to show how the effects of linear processing on both types of waveform may be assessed. We have only rarely encountered functions—such as the amplitude distribution of a signal—which fail to fit naturally into this general theme. The reasons for the emphasis on time and frequency descriptions are really twofold: on the one hand, linear processors form a class of device which has found very widespread practical application; and the design and development of linear systems has been greatly stimulated by the relative simplicity of their mathematical description. But in spite of these advantages of linear processing, the reader is asked to bear in mind that a variety of useful signal techniques may be achieved by using nonlinear systems and devices, and that the analysis and synthesis of signals and systems by reference to Fourier and Laplace transform techniques is only part of the story. This general point has been made several times in the text, for example by discussing classes of nonsinusoidal orthogonal functions in chapter 2, and by making a brief reference to nonlinear processing at the end of chapter 7.

Considerable attention has been paid to sampled-data signals. Once again, there are two main reasons for this. Firstly, a number of important concepts—such as convolution and matched filtering—are really quite straightforward when discussed by reference to sampled-data signals, whereas the conventional treatment in terms of continuous signals and analogue systems tends to involve much more demanding mathematics. Secondly, there is little doubt that sampled signals have arrived and that they will continue to grow in practical importance. The more signals and data are stored in digital computers, and transmitted from place to place in the form of discrete electrical pulses, the greater will become the incentive to process them in sampled-data form. The trend towards digital signal processing must be expected to continue.