

Supplementary Material for Chapter 9: “Noise Analysis and Random Processes in the (t, f) Domain”¹

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The zip files contained in this directory contain the supplementary materials² (SM) for each Section of the Chapter separately. The user is advised to read the read me file for each Section to get a good overview of the contents of its SM. Below is a brief overview of the Chapter in the book. Part 2, next page, is the actual inventory of the SM provided for this chapter.

1. Book Chapter SM Overview:

Time-Frequency Distributions (TFDs) have been studied initially for deterministic signals. Noise is an ever permanent feature in signals and so there is a need to extend the formulation of TFDs to the case of random signals. This chapter describes time-frequency $((t, f))$ methodologies developed to deal with randomness in non-stationary signals and systems. The topics for which SM is available are described below.

Noise analysis in the (t, f) domain is presented with derivations of mean and variance of TFDs of random signals (Section 9.1: see page 2). Both cases of additive and multiplicative noise, including white and colored noise, are studied. Conventional TFDs such as the spectrogram and WVD are extended to be robust to impulse noise (9.3: see page 2). The last section presents methods for spectral analysis of cyclostationary processes i.e. processes whose statistical properties vary cyclically with time (9.6: see page 2).

¹ B. Boashash (ed.), Time-Frequency Signal Analysis and Processing, 2nd Edition (London: Elsevier / Academic Press, December 2015); ISBN 978-0-12-398499-9.

² All of the book supplementary materials can be found [here](#).

1. Book Chapter SM Main Script Inventory:

Supplementary material	Brief Description
<i>9.1: Analysis of Noise in Time-Frequency Distributions</i>	
<i>Fig_9_1_1.m</i>	This script is the implementation of Fig. 9.1.1 on page 530 of the book.
<i>Avg_TFDs.m</i>	It computes the averaged TFDs of a noisy signal which is utilized in the main script <i>Fig_9_1_1.m</i> .
<i>Section 9.3: Robust Time-Frequency Distributions</i>	
<i>Rob_wd1.m</i>	This script is the implementation of Fig. 9.3.1 on page 545 of the book.
<i>Section 9.6: Characterization of Cyclostationary Signals and Their Generalizations</i>	
<i>Figs_Art96.m</i>	This script is the implementation of Figs. 9.6.1 and 9.6.2 on pages 567 and 569 of the book.