

# Supplementary Material for Chapter 6: “Advanced Implementation and Realization of TFDs”<sup>1</sup>

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The zip files contained in this directory contain the supplementary materials<sup>2</sup> (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. Part 1 is a brief overview of the Chapter in the book. Part 2 is the actual inventory of the SM provided for this chapter.

## 1. Book Chapter SM Overview:

Design of efficient algorithms is crucial to effectively utilize Time-Frequency Distributions (TFDs) in real life applications. This Chapter presents the required procedures, techniques and methodologies for an effective implementation of such time-frequency  $(t, f)$  methods. This chapter is important for those interested in practical implementations and it is the foundation for the TFSAP toolbox described in Chapter 17. The topics for which SM is available are described below.

Short-time Fourier transform (STFT) is the basis for creating an alternative method to realize quadratic TFDs (6.2: see Page 2). Computation of quadratic TFDs can also be done using a spectrogram-based decomposition (6.4: see Page 2). In addition, computational procedures, for implementing quadratic time-frequency methods, are outlined along with the required algorithms and MATLAB<sup>TM</sup> code fragments (6.5: see Page 2). Finally, the last section focuses on the design of memory-efficient algorithms to implement discrete-time TFDs. It describes how to deal with the issues of memory when processing large amount of data in applications such as biomedicine, telecommunications or geophysics (6.6: see Page 2).

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

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

## 2. Book Chapter SM Inventory:

Supplementary material	Brief Description
<i>Section 6.2: Quadratic and Higher Order Time-Frequency Analysis Based on the STFT</i>	
<i>Figure_2.m</i>	This script reproduces the results depicted in Fig.6.2.2 on page 347 of the book.
<i>Figure_3.m</i>	This script reproduces the results depicted in Fig. 6.2.3 on page 348 of the book.
<i>Fig_2_3_MovieOneFrame.m</i>	This script illustrates the results for selected L and Q values to further help the user.
<i>Section 6.4: Spectrogram Decompositions of Time-Frequency Distributions</i>	
<i>Fig_6_4_1.m</i>	This script produces results that are similar to the ones depicted in Fig. 6.4.1, on page 363 of the book.
<i>6.5: Computation of Discrete Quadratic TFDs</i>	
<i>tlkern.m</i>	This is an experimental MATLAB function described in Section 6.5
<i>Section 6.6: Memory-Efficient Algorithms for Quadratic TFDs</i>	
<i>bird_example.m</i>	This script reproduces the results in Fig. 6.6.2 on page 381 of the book.
<i>example.m</i>	This script produces similar results to the ones in Fig. 6.6.2, on page 681, using a different test signal.
<i>MSE_example.m</i>	This script produces similar results to the ones in Figs. 6.6.2 and 6.6.3, on pages 381-382.