

Supplementary Material for Chapter 14: “Time-Frequency Methods in Radar, Sonar, and Acoustics”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 review 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:

The fields of radar and sonar are traditionally key application areas and testing grounds for advances in signal processing, including time-frequency $((t, f))$ methodologies. The topic for which SM is available is described below.

A linear (t, f) representation provides high resolution suitable for preserving the full dynamic range of baseband Doppler radar signals return from a helicopter target (14.1: see below). It is then shown that in sonar, there is a clear rationale for using (t, f) processing of returns to provide useful information about targets such as ships and sea creatures (14.5: see below). The last two sections focus on the application of sparse (t, f) distributions to geophysics acoustics (14.6: see below) and a brief tutorial review of (t, f) audio processing for speech and underwater acoustics applications, indicating that high-resolution TFDs can result in much improved performance (14.7: see below).

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](#).

2. Book Chapter SM Main Script Inventory:

Supplementary material	Brief Description
<i>Section 14.1: Time-Frequency Analysis of Helicopter Doppler Radar Data</i>	
<i>TFSAP_14.1_afosr05.ppt</i>	The offered slides extend and elaborate the material covered in Section 14.1 and illustrate its applicability for different radar signals.
<i>Section 14.5: Time-Frequency Sonar Processing</i>	
<i>Exp1.m</i>	This script produces results that are similar to the ones depicted in Fig. 14.5.2, on page 834 of the book.
<i>Exp2.m</i>	This script produces results that demonstrates advanced approaches using high-resolution TFDs as in described Section 14.5.3.2.
<i>Section 14.6: Sparse Time-Frequency Distributions Applied to Geophysics</i>	
<i>Figure_14_6_2.m</i>	This script produces results that are similar to those depicted in Fig. 14.6.2, on page 840 of the book.
<i>Section 14.7: Audio Speech and Underwater Signals Time-Frequency Characteristics Enhancement</i>	
<i>testFMSin.m</i>	This script reproduces the results that are depicted in Figs. 14.7.3 and 14.7.4, on pages 848 and 849 of the book.
<i>test_script5.m</i>	This script produces a subset of the results that are depicted in Fig. 14.7.5, on page 850 of the book.
<i>Test_script6.m</i>	This script reproduces results that are similar to the ones depicted in Fig. 14.7.6, on page 851 of the book.
<i>Test_script7.m</i>	This script reproduces the results that are depicted in Fig. 14.7.7, on page 851 of the book.
<i>Test_script8.m</i>	This script reproduces the results depicted in Fig. 14.7.8, on page 852 of the book.
<i>Test_script9.m</i>	This script produces the results depicted in Fig. 14.7.9, on page 852 of the book.

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