

LJUBIŠA STANKOVIĆ

Editor

TIME-FREQUENCY SIGNAL ANALYSIS

Contributors

Johann F. BÖHME
Vladimir KATKOVNIK
Martin BASTIAANS
Boualem BOASHASH
Ioannis PITAS
Akira OHSUMI
Alex GERSHMAN
Tatiana ALIEVA
Rainer HERPERS
Braham BARKAT
Hiroshi IJIMA
Jan TILP
Mark URLAUB

Zdravko USKOKOVIĆ
Srdjan STANKOVIĆ
Igor DJUROVIĆ
Veselin IVANOVIĆ
Dušan PETRANOVIĆ
Radomir LAKOVIĆ
Zoran PETROVIĆ
Božo KRSTAJIĆ
Miloš DAKOVIĆ
Radovan STOJANOVIĆ
Vesna POPOVIĆ
Slobodan DJUKANOVIĆ
Vojislav VUKOVIĆ

research monograph 1993-2003
Volkswagen foundation supported project 2001-2003

2004

LJUBIŠA STANKOVIĆ

Editor

TIME-FREQUENCY SIGNAL ANALYSIS

Contributors

Johann F. BÖHME

Vladimir KATKOVNIK

Martin BASTIAANS

Boualem BOASHASH

Ioannis PITAS

Akira OHSUMI

Alex GERSHMAN

Tatiana ALIEVA

Rainer HERPERS

Braham BARKAT

Hiroshi IJIMA

Jan TILP

Mark URLAUB

Zdravko USKOKOVIĆ

Srdjan STANKOVIĆ

Igor DJUROVIĆ

Veselin IVANOVIĆ

Dušan PETRANOVIĆ

Radomir LAKOVIĆ

Zoran PETROVIĆ

Božo KRSTAJIĆ

Miloš DAKOVIĆ

Radovan STOJANOVIĆ

Vesna POPOVIĆ

Slobodan DJUKANOVIĆ

Vojislav VUKOVIĆ

research monograph 1993-2003

Volkswagen foundation supported project 2001-2003

2004

Center for Signals, Systems and Information Theory
Faculty of Electrical Engineering
University of Montenegro
Podgorica, Montenegro

www.tfsa.cg.yu
l.stankovic@ieee.org
Podgorica, January 2004

This book is printed as a research report, in a very limited number of copies, for a private and noncommercial use. Copyright on the included papers is owned by the institutions that publish corresponding journals, indicated at the bottom of the first page for each paper.

PREFACE

The aim of this research monograph is to present the results in time-frequency analysis achieved by the group within the Center for Signals, Systems, and Information Theory from the University of Montenegro, during the course of last ten years. Contributions are written by the members of this group and their colleagues from other institutions all over the world.

The monograph is composed of the selected papers arranged in a consistent manner. The related papers are grouped into twelve parts, preceded by a short introduction to the respective area.

The very form of the monograph inevitably causes some repetition and overlap of the certain information and results. Since the papers presented here are aimed for, and were published in the most renowned journals, it is sometimes assumed that the reader is already familiar with this area. We hope that the introductory exposition, as well as the composition of the papers along with the references in each of them, will alleviate this problem.

The work of the group has been supported during these years by several institutions. We want to thank to the Electrical Engineering Department of the University of Montenegro, Montenegrin Academy of Science and Art (CANU), Ministry of Science of the Republic of Montenegro, and the Alexander von Humboldt foundation.

In particular, the editor and most of the authors are thankful to the Volkswagen foundation, Federal Republic of Germany, that supported the group from Montenegro during the last three years, under the project: "Time-frequency Signal Analysis: Methods and Applications" lead by Prof. LJubiša Stanković and Prof. Johann F. Böhme. Project is realized in cooperation with the Signal Theory group from the Ruhr University Bochum, Germany. In that sense, this monograph could also be considered as a supplement to the final report for this project.

Montenegro, January 2004.

CONTENTS

Part 1. Introduction to time-frequency analysis	10
Part 2. An analysis of time-frequency representations	62
An analysis of some time-frequency and time-scale distributions, <i>LJ. Stanković</i>	63
Auto-term representation by the reduced interference distributions; The procedure for a kernel design, <i>LJ. Stanković.....</i>	80
Relationship between the Ambiguity function coordinate transformations and Fractional Fourier transform, <i>LJ. Stanković, I. Djurović.....</i>	91
An analysis of instantaneous frequency presentation using time-frequency distributions -Generalized Wigner distribution, <i>LJ. Stanković, S. Stanković.....</i>	95
On rotated time-frequency kernels, <i>T. Alieva, M. J. Bastiaans, LJ. Stanković</i>	101
Signal reconstruction from two close fractional Fourier power spectra, <i>T. Alieva, M. J. Bastiaans, LJ. Stanković</i>	108
Part 3. S-Method.....	122
A method for time-frequency signal analysis, <i>LJ. Stanković</i>	123
A note on “An overview of aliasing errors in discrete time formulations of time-frequency representations”, <i>LJ. Stanković, I. Djurović</i>	130
Signal dependent S-method, <i>LJ. Stanković</i>	134
An architecture for the realization of a system for time-frequency signal analysis, <i>S. Stanković, LJ. Stanković</i>	140
A flexible system for time frequency analysis, <i>S. Stanković, D. Petranović, LJ. Stanković</i>	147
An architecture for the VLSI design of systems for time-frequency analysis and time-varying filtering, <i>S. Stanković, LJ. Stanković, V. Ivanović, R. Stojanović.....</i>	156

A virtual instrument for time-frequency analysis, <i>I. Djurović, LJ. Stanković</i>	173
Time-frequency analysis of multiple resonances in combustion engine signals, <i>LJ. Stanković, J. F. Böhme</i>	184
Estimation of multicomponent signals by using time-frequency representations with application to knock signal analysis, <i>I. Djurović, M. Urlaub, J. F. Böhme, LJ. Stanković</i>	200
Time-frequency representation based on the reassigned S-method, <i>I. Djurović, LJ. Stanković</i>	207
A measure of some time-frequency distributions concentration, <i>LJ. Stanković</i>	212
Time-frequency signal analysis based on the windowed fractional Fourier transform, <i>LJ. Stanković, T. Alieva, M. J. Bastiaans</i>	224
Part 4. Noise influence on the time-frequency representations	235
Wigner distribution of noisy signals, <i>LJ. Stanković, S. Stanković</i>	236
On the Wigner distribution of the discrete-time noisy signals with application to the study of quantization effects, <i>LJ. Stanković, S. Stanković</i>	243
Unified approach to the noise analysis in the spectrogram and Wigner distribution, <i>LJ. Stanković, V. Ivanović, Z. Petrović</i>	251
Further results on the minimum variance time-frequency distribution kernels, <i>LJ. Stanković, V. Ivanović</i>	265
Do the reduced interference distributions reduce noise influence? <i>LJ. Stanković</i>	276
Finite word-length effects in implementation of distributions for time- frequency analysis, <i>V. Ivanović, LJ. Stanković, D. Petranović</i>	281
An algorithm for the Wigner distribution of noisy signals realization, <i>LJ. Stanković</i>	292
The Wigner distribution of noisy signals with adaptive time-frequency varying window, <i>LJ. Stanković, V. Katkovnik</i>	296
Analysis of Noise in Time-Frequency Distributions, <i>LJ. Stanković</i>	310

Estimates of the Wigner distribution in Gaussian noise environment, <i>I. Djurović, L.J. Stanković, J. F. Böhme</i>	317
Part 5. Higher order representations	322
An analysis of Wigner higher order spectra of multicomponent signals, <i>L.J. Stanković</i>	323
A method for improved distribution concentration in the time-frequency analysis of multicomponent signals using the L-Wigner distribution, <i>L.J. Stanković</i>	329
Multitime definition of the Wigner higher order distribution: L-Wigner distribution, <i>L.J. Stanković</i>	338
L-class of time-frequency distributions, <i>L.J. Stanković</i>	344
Modified Wigner bispectrum and its generalizations, <i>S. Stanković, L.J. Stanković, Z. Uskoković</i>	349
Introducing time-frequency distribution with a "complex-time" argument, <i>S. Stanković, L.J. Stanković</i>	359
Time-frequency distributions with complex argument, <i>L.J. Stanković</i>	364
On the realization of the polynomial Wigner-Ville distribution for multicomponent signals, <i>L.J. Stanković</i>	380
Part 6. Highly concentrated energy distributions	385
A time-frequency distribution concentrated along the instantaneous frequency, <i>L.J. Stanković</i>	386
Highly concentrated time-frequency distributions: Pseudo quantum signal representation, <i>L.J. Stanković</i>	391
S class of time-frequency distributions, <i>L.J. Stanković</i>	403
Local polynomial Wigner distribution, <i>L.J. Stanković</i>	415
Order Adaptive Local Polynomial FT Based Interference Rejection In Spread Spectrum Communication Systems, <i>L.J. Stanković, S. Djukanović</i>	419
On the Capon's method application in time-frequency signal analysis, <i>L.J. Stanković, V. Popović, M. Daković</i>	430
Part 7. Instantaneous frequency estimation using time-frequency representations	436

Performance of spectrogram as IF estimator, <i>LJ. Stanković, M. Daković, V. Ivanović</i>	437
Performance of Quadratic Time-Frequency Distributions as Instantaneous Frequency Estimators, <i>V. Ivanović, M. Daković, LJ. Stanković</i>	441
Instantaneous frequency estimation using the Wigner distribution with varying and data driven window length, <i>V. Katkovnik, LJ. Stanković</i>	458
Algorithm for the instantaneous frequency estimation using time-frequency distributions with adaptive window width, <i>LJ. Stanković, V. Katkovnik</i>	472
Instantaneous frequency estimation using the periodogram with time varying window length, <i>V. Katkovnik, LJ. Stanković</i>	478
Adaptive window in the polynomial Wigner-Ville distributions for the instantaneous frequency estimation of FM signal in additive Gaussian noise, <i>B. Barkat, B. Boashash, LJ. Stanković</i>	492
Instantaneous frequency estimation by using the Wigner distribution and linear interpolation, <i>LJ. Stanković, I. Djurović, R. M. Laković</i>	498
Parametric estimation of the FM signals using Wigner distribution-based maximum likelihood estimator, <i>I. Djurović, A. Ohsumi, H. Ijima</i>	507
Instantaneous frequency estimation using robust spectrogram with varying window length, <i>V. Katkovnik, I. Djurović, LJ. Stanković</i>	514
Influence of high noise on the instantaneous frequency estimation using quadratic time-frequency distributions, <i>I. Djurović, LJ. Stanković</i>	527
An algorithm for the Wigner distribution based instantaneous frequency estimation in a high noise environment, <i>I. Djurović, LJ. Stanković</i>	532
Part 8. Robust time-frequency analysis	546
Median filter based realizations of the robust time-frequency distributions, <i>I. Djurović, V. Katkovnik, LJ. Stanković</i>	547
Robust L-estimation based forms of signal transforms and time-frequency representations, <i>I. Djurović, LJ. Stanković, J. F. Böhme</i>	553
Realization of the Robust Filters in the Frequency Domain, <i>I. Djurović, LJ. Stanković</i>	565
Robust Wigner distribution with application to the instantaneous frequency estimation <i>I. Djurović, LJ. Stanković</i>	570

Analysis of polynomial FM signals corrupted by heavy-tailed noise, <i>B. Barkat, LJ. Stanković</i>	584
Robust adaptive local polynomial Fourier transform, <i>I. Djurović</i>	591
Robust two-dimensional DFT, <i>I. Djurović, LJ. Stanković, J. F. Böhme</i>	598
Part 9. Time-varying filtering	604
On the time-frequency analysis based filtering, <i>LJ. Stanković</i>	605
Time-varying filtering of speech signals using linear prediction, <i>S. Stanković, J. Tilp</i>	619
About time-variant filtering of speech signals with time-frequency distributions for hands-free telephone systems, <i>S. Stanković</i>	623
Part 10. Multidimensional space-spatial frequency analysis	632
On the local frequency, group shift and cross-terms in some multidimensional time- frequency distributions; A method for multidimensional time-frequency analysis, <i>S. Stanković, LJ. Stanković, Z. Uskoković</i>	633
System architecture for space-frequency image analysis, <i>S. Stanković, I. Djurović, V. Vuković</i>	643
Space/spatial-frequency analysis based filtering, <i>LJ. Stanković, S. Stanković, I. Djurović</i>	647
Nonparametric algorithm for the local frequency estimation, of multidimensional signals, <i>I. Djurović, LJ. Stanković</i>	660
Part 11. Time-frequency analysis in multimedial applications	670
Watermarking in the space/spatial-frequency domain using two- dimensional Radon Wigner distribution, <i>S. Stanković, I. Djurović, I. Pitas</i>	671
Generalization of the Fourier domain watermarking to the space/spatial frequency domain, <i>I. Djurović, S. Stanković, I. Pitas, LJ. Stanković</i>	686
Digital watermarking in the fractional Fourier transformation domain, <i>I. Djurović, S. Stanković, I. Pitas</i>	691
An approach to the optimal watermark detection, <i>S. Stanković, I. Djurović, R. Herpers, LJ. Stanković</i>	695

Motion parameters estimation by using time-frequency representations, <i>S. Stanković, I. Djurović</i>	699
Estimation of time-varying velocities of moving objects by time-frequency representations, <i>I. Djurović, S. Stanković</i>	702
Part 12. Adaptive algorithm for the bias to variance trade-off with applications	721
Performance analysis of the adaptive algorithm for bias-to-variance trade-off, <i>LJ. Stanković</i>	722
Instantaneous frequency estimation using higher order L-Wigner distributions with data driven order and window length, <i>LJ. Stanković, V. Katkovnik</i>	732
Sensor array signal tracking using a data-driven window approach, <i>A. B. Gershman, LJ. Stanković, V. Katkovnik</i>	747
Modification of the ICI rule based IF estimator for high noise environments, <i>I. Djurović, LJ. Stanković</i>	756
Combined adaptive filter with LMS based algorithms, <i>B. Krstajić, LJ. Stanković, Z. Uskoković</i>	765
An approach to variable step-size LMS algorithm, <i>B. Krstajić, LJ. Stanković, Z. Uskoković</i>	772
Adaptive windowed Fourier transform, <i>I. Djurović, LJ. Stanković</i>	775
Part 13. Appendix	785
Analysis of noise in time-frequency distributions, <i>LJ. Stanković</i>	786
Adaptive instantaneous frequency estimation using TFDs, <i>LJ. Stanković</i>	793
Robust time-frequency distributions, <i>V. Katkovnik, I. Djurović, LJ. Stanković</i>	799
Time-frequency filtering of speech signals in hands-free telephone systems, <i>S. Stanković</i>	804
Measuring time-frequency distributions concentration, <i>LJ. Stanković</i>	810
Quadratic and higher order time-frequency analysis based on the STFT, <i>LJ. Stanković</i>	816
<i>Literature</i>	824

REFERENCES

- [1] P.Abry, P.Flandrin: "On the initialization of the discrete Wavelet transform algorithm", *IEEE Sig. Proc. Let.*, vol. 1, No. 2, Feb. 1994, pp. 32-34.
- [2] M.T.Abuelm'atti: "A simple method for estimating the spectrum of exponentially damped sinusoidal signals", *Circuit, Systems, and Signal Processing*, vol.14, no.5, May 1995.
- [3] M.H.Ackroyd: "Short-time spectra and time-frequency energy distribution", *J.Acoust.Soc.Am.*, vol.50, 1970, pp.1229-1231.
- [4] E.H.Adelson: "Digital signal encoding and decoding apparatus", *U.S.Patent 4 939 515*, 1990.
- [5] A.Akan, L.F.Chaparro: "Multiresolution Gabor expansion for evolutionary spectral analysis", *Signal Processing*, vol.63, no.3, Mar.1998.
- [6] J.B.Allen, L.R.Rabiner: "A unified approach to short-time Fourier analysis and synthesis", *Proc.IEEE*, vol.65, no.11, Nov.1977, pp.1558-1564.
- [7] T.Alieva, M.J.Bastiaans, L.J.Stanković: "Signal reconstruction from two close fractional Fourier power spectra", *IEEE Trans.on Signal Processing*, vol.51, no.1, Jan.2003, pp.112-123.
- [8] T.Alieva, M.J.Bastiaans, L.J.Stanković: "Wigner distribution reconstruction from two projections", in *Proc.11th IEEE Signal Processing Workshop on Statistical Signal Processing*, 2001, pp.325-328.
- [9] L.B.Almeida: "The fractional Fourier transform and time-frequency representations", *IEEE Trans.Signal Processing*, vol.42, pp.3084-3091, 1994.
- [10] L.B.Almeida: "Product and convolution theorems for the fractional Fourier transform", *IEEE Sig.Proc.Let.*, vol.4, No.1, Jan.1997, pp.15-17.
- [11] P.O.Amblard, M.Gaeta, J.L.Lacoume: "Statistic for complex variables and signals - Part I: Variables", *Signal Processing*, vol.53, no.1, Jan.1997.
- [12] P.O.Amblard, M.Gaeta, J.L.Lacoume: "Statistic for complex variables and signals - Part II: Signals", *Signal Processing*, vol.53, no.1, Jan.1997.
- [13] M.G.Amin: "A new approach to recursive Fourier transform", *Proc.IEEE*, vol.75, 1987, pp.1357-1358.
- [14] M.G.Amin: "A comparison between two measures of convergence in recursive-window based spectral estimation", *IEEE Trans.on Acoust., Speech, Signal Processing*, vol.38, Aug.1990, pp.1457-1459
- [15] M.G.Amin: "Spectral smoothing and recursion based on the nonstationarity of the autocorrelation function", *IEEE Trans.on Signal Processing*, vol.41, no.2, Feb.1993, pp.930-934.
- [16] M.G.Amin: "Spectral decomposition of time-frequency distribution kernels", *IEEE Trans.on Signal Processing*, vol.42, no.5, May 1994, pp.1156-1165.
- [17] M.G.Amin: "Minimum variance time-frequency distribution kernels for signals in additive noise", *IEEE Trans.Signal Processing*, vol.44, no.9, Sep.1996, pp.2352-2356.
- [18] M.G.Amin: "Recursive kernels for time-frequency signal representations", *IEEE Sig.Proc.Let.*, vol.3, No.1, Jan.1996, pp.16-18.
- [19] M.G.Amin, K.D.Feng: "Short-time Fourier transform using cascade filter structures", *IEEE Trans.on Circuits and Systems*, vol.42, no.10, Oct.1995, pp.631-641.
- [20] M.G.Amin, G.T.Venkatesan, J.F.Carroll: "A constrained weighted least squares approach for time-frequency distribution kernel design", *IEEE Trans.on Signal Processing*, vol.44, no.5, May 1996, pp.1111-1124.
- [21] M.G.Amin, W.J.Williams: "High spectral resolution time-frequency distribution kernels", *IEEE Trans.on Signal Processing*, vol.46, no.10, Oct.1998, pp.2796-2804.
- [22] M.G.Amin: "Time-frequency distributions in statistical signal and array processing", *Signal Processing Mag.*, Sepr.1998, pp.32-42.
- [23] K.Annant, F.Dowl, G.Rodrigue: "Vector quantization of ECG wavelet coefficients", *IEEE Sig.Proc.Let.*, vol.2, No.7, Jul.1995, pp.130-131.

- [24] G.Andria, M.Savino, A.Trotta: "Application of the Wigner-Ville distribution to measurement of transient signals", *IEEE Trans.IM*, vol.43, no.2, April 1994, pp.187-193.
- [25] G.R.Arce, S.R.Hasan,: "Elimination of interference terms of the discrete Wigner distribution using nonlinear filtering", *IEEE Trans.on Signal Processing*, vol.48, no.8, Aug.2000, pp.2321-2331.
- [26] L.E.Atlas, G.D.Benard, S.B.Narayanan: "Applications of time-frequency analysis to signals from manufacturing and machine monitoring sensors", *Proc.IEEE*, vol.84, no.9, Sept.1996, pp.1319-1329.
- [27] L.E.Atlas, Y.Zhao, R.J. Marks II: "The use of cone shape kernels for generalized time-frequency representations of nonstationary signals", *IEEE Trans. Acoust., Speech, Signal Processing*, vol.38, 1990, pp.1084-1091.
- [28] O.C.Au: "On sensitivity of detector structures to contaminants in non-white mixture noise models", *Signal Processing*, vol.50, no.3, Mar.1996.
- [29] F.Auger: "Some simple parameter determination rules for the generalized Choi-Williams and Butterworth distributions", *IEEE Sig.Proc.Let.*, vol.1, No.1, Jan.1994, pp.9-11.
- [30] F.Auger, P.Flandrin: "Improving the readability of time-frequency and time-scale representations by the reassignment method", *IEEE Trans.on Signal Processing*, vol.43, no.5, May 1995, pp.1068-1089.
- [31] L.Auslander, C.Buffalano.R.Orr, R.Tolimieri: "A comparison of the Gabor and short-time Fourier transforms for signal detection and feature extraction in noisy environments", *Proc.SPIE Int.Soc.Opt.Eng.*, vol.1348, Nov.1990, pp.230-247.
- [32] L.Auslander, I.Gertner, R.Tolimeri: "The discrete Zak transform application time-frequency analysis and synthesis of nonstationary signals", *IEEE Trans.on signal Processing*, vol.39, no.4, Apr.1991, pp.825-835.
- [33] S.Aviyente, W.J.Williams: "Improved frequency marginal estimates for time-frequency distributions", *Proc.IEEE ICASSP*, vol.2, pp.641-644, 2000.
- [34] R.G.Baraniuk, M.Coates, P.Steeghs: "Hybrid linear/quadratic time-frequency attributes", *IEEE Trans.on Signal Processing*, vol.49, no.4, April 2001, pp.760-766.
- [35] R.G.Baraniuk, P.Flandrin, A.J.E.M.Janssen, O.J.J.Michel: "Measuring time-frequency information content using the Renyi entropies", *IEEE Trans.on Information Theory*, vol.47, no.4, May 2001, pp.1391-1409.
- [36] B.Barkat: "Instantaneous frequency estimation of nonlinear frequency-modulated signals in the presence of multiplicative and additive noise", *IEEE Trans.on Signal Processing*, vol.49, no.10, Oct.2001, pp.2214-2222.
- [37] B.Barkat, B.Boashash: "A high-resolution quadratic time-frequency distribution for multicomponent signals analysis", *IEEE Trans.on Signal Processing*, vol.49, no.10, Oct.2001, pp.2232-2239.
- [38] B.Barkat, B.Boashash: "IF estimation of linear FM signals corrupted by multiplicative and additive noise: a time-frequency approach", *Proc.IEEE ICASSP*, vol.2, pp.661-664, 2000.
- [39] B.Barkat, L.J.Stanković: "Robust PWVD for the analysis of polynomial FM signals in non-Gaussian noise", in *Proc.9th Int.Conf.on Electronics, Circuits and Systems*, vol.3, Sept.2002, pp.1007-1010.
- [40] M.J.Bastiaans, A.J.van Leest: "From the rectangular to the Quincunx Gabor lattice via fractional Fourier transformation", *IEEE Sig.Proc.Let.*, vol.5, No.8, Aug.1998, pp.203-205.
- [41] M.J.Bastiaans, T.Alieva, L.J.Stanković: "On rotated time-frequency kernels", *IEEE Sig.Proc.Let.*, vol.9, no.11, Nov.2002, pp.378-381.
- [42] R.Balart: "Matrix reformulation of the Gabor transform", *Opt.Eng.*, vol.31, no.6, June 1992, pp.1235-1242.
- [43] R.G.Baraniuk: "A limitation of the kernel method for joint distributions of arbitrary variables", *IEEE Sig.Proc.Let.*, vol.3, No.2, Feb.1996, pp.51-53.
- [44] R.G.Baraniuk: "Covariant time-frequency representations through unitary equivalence", *IEEE Sig.Proc.Let.*, vol.3, No.3, Mar.1996, pp.79-81.
- [45] R.G.Baraniuk: "Beyond time-frequency analysis: Energy densities in one and many dimensions", *IEEE Trans.on Signal Processing*, vol.46, no.9, Sept.1998, pp.2305-2315.

- [46] R.G.Baraniuk, L.Cohen: "On joint distributions for arbitrary variables", *IEEE Sig.Proc.Let.*, vol.2, No.1, Jan.1995, pp.10-12.
- [47] R.G.Baraniuk, D.L.Jones: "Signal-dependent time-frequency analysis using radially-gaussian kernel", *IEEE Trans.on Signal Processing*, vol.41, no.3, 1993, pp.263-284.
- [48] R.G.Baraniuk, D.L.Jones: "A signal dependent time-frequency representation: Fast algorithm for optimal kernel design", *IEEE Trans.on Signal Processing*, vol.42, no.1, Jan.1994, pp.134-146.
- [49] R.G.Baraniuk, D.L.Jones: "Wigner-based formulation of the chirplet transform", *IEEE Trans.on Signal Processing*, vol.44, no.12, Dec.1996, pp.3129-3135.
- [50] F.Barbaresco: "Half-quadratic regularization of time-frequency AR analysis for recovery of abrupt spectral discontinuities and their detection by a recursive Siegel metric based on information geometry", *Proc.EURASIP'98*, vol.2, Sept.1998, Rhodes, pp.621-624.
- [51] S.Barbarossa: "Analysis of multicomponent LFM signals by a combined Wigner-Hough transform", *IEEE Trans.on Signal Processing*, vol.43, no.6, June 1995, pp.1511-1515.
- [52] S.Barbarossa, C.Gregori, G.Nicastro: "On the use joint time-frequency representations in SAR signal processing", *Europ.Trans.on Telecommun.*, vol.2, no.6, Nov.-Dec.1991, pp 665-674.
- [53] S.Barbarosa, O.Lemoine: "Analysis of nonlinear FM signals by pattern recognition of their time-frequency representation", *IEEE Sig.Proc.Let.*, vol.3, No.4, apr.1996, pp.112-115.
- [54] S.Barbarossa, V.Petrone: "Analysis of polynomial-phase signals by the integrated generalized ambiguity functions", *IEEE Trans.on Signal Processing*, vol.45, no.2, Feb.1997, pp.316-328.
- [55] S.Barbarossa, A.Scaglione, G.B.Giannakis: "Product high-order ambiguity function for multicomponent polynomial-phase signal modeling", *IEEE Trans.on Signal Processing*, vol.46, no.3, Mar.1998, pp.691-709.
- [56] S.Barbarossa, J.L.Krolak: "Adaptive time-varying cancellation of wideband interferences in spread-spectrum communications based on time-frequency distributions", *IEEE Trans.on Signal Processing*, vol.47, no.4, Apr.1999, pp.957-965.
- [57] B.Barkat, B.Boashash, L.J.Stanković: "Adaptive window in the PWVD for the IF estimation of FM signals in additive Gaussian noise", in *Proc.IEEE ICASSP 1999*, pp.1317-1320
- [58] M.Barni Mauro, F.Bartolini, V.Cappellini, A.Piva Alessandro: "A DCT-domain system for robust image watermarking", *Signal Processing*, vol.66, no.3, 1998, pp.357-372.
- [59] P.Bas, J.M.Chassery, F.Davoine: "Self-similarity based image watermarking", *Proc.int.conf.IEEE ASSP, Munich'97*, pp.2277-2280, May 1997.
- [60] M.J.Bastiaans: "The Wigner distribution function applied to optical signals and systems", *Opt.Commun.*, vol.25, pp.26-30, 1978.
- [61] M.J.Bastiaans: "Application of the Wigner distribution function in optics", in Eds.W.F.G.Mecklenbrauker, F.Hlawatsch: "The Wigner distributions - theory and applications in signal processing", Elsevier, 1997.
- [62] M.J.Bastiaans: "Optimum oversampling in the rectangular Gabor scheme", *Proc.EURASIP'98*, vol.2, Sept.1998, Rhodes, pp.617-620.
- [63] M.J.Bastiaans: "Application of the Wigner distribution function to partially coherent light", *J.Opt.Soc.Am.*, A3, pp.1227-1238, 1986.
- [64] M.J.Bastiaans, T.Alieva, L.J.Stanković: "On rotated time-frequency kernels", *IEEE Sig.Proc.Let.*, vol.9, no.11, Nov.2002, pp.378-381.
- [65] M.Benidir: "Characterization of polynomial functions and application to time-frequency analysis", *IEEE Trans.on Signal Processing*, vol.45, no.5, May 1997, pp.1351-1355.
- [66] J.Bertrand, P.Bertrand: "Affine time-frequency distributions", in *Time-frequency analysis - Methods and Applications*, B.Boashash ed., Longman-Cheshire, Melbourne, 1991.
- [67] B.Boashash: "Estimating and interpreting the instantaneous frequency of a signal Part 1", *IEEE Proc.*, vol.80, no.4, April 1992, pp.519-538.
- [68] B.Boashash: "Estimating and interpreting the instantaneous frequency of a signal Part 2", *IEEE Proc.*, vol.80, no.4, April 1992, pp.519-538.
- [69] B.Boashash, J.B.Black: "An efficient real time implementation of the Wigner-Ville distribution", *IEEE Trans.Acoust.Speech, Signal Processing*, vol ASSP-35, no 11, Nov 1987.pp.1611-1618.

- [70] B.Boashash, P.O'Shea: "Polynomial Wigner-Ville distributions and their relationship to time-varying higher order spectra", *IEEE Trans.on Signal Processing*, vol.42, no.1, Jan.1994, pp.216-220.
- [71] B.Boashash, B.Ristić: "Analysis of FM signals affected by Gaussian AM using the reduced WV Trispectrum", *Proc.ICASSP 93*, vol.IV, pp.408-411.
- [72] B.Boashash, B.Ristić: "Polynomial WVDs and time-varying polyspectra", in *Higher Order Statistical Signal Processing*, B.Boashash et al, eds., Longman Cheshire, 1993.
- [73] B.Boashash, B.Ristić: "Polynomial time-frequency distributions and time-varying higher order spectra: Applications to analysis of multicomponent FM signals and to treatment of multiplicative noise" *Signal Processing*, vol.67, no.1, May 1998, pp.1-23.
- [74] B.Boashash, V.Sucic: "Resolution measure criteria for the objective assessment of the performance of quadratic time-frequency distributions", *IEEE Trans.on Signal Processing*, vol.51, no.5, May 2003, pp.1253-1263.
- [75] P.Bonato, Z.Erim: "Decomposition of superimposed waveforms using the cross time frequency transform", *Proc.IEEE ICASSP*, vol.6, pp.3550-3553, 2000.
- [76] A.Bors, I.Pitas: "Image watermarking using DCT domain constraints", *Proc.IEEE Int.Conf.Image Processing'96*, pp.231-234, Lausanne, Switzerland, Sept.1996.
- [77] G.Bi: "New split-radix algorithm for the discrete Hartley transform", *IEEE Trans.on Signal Processing*, vol.45, no.2, Feb.1997, pp.297-303.
- [78] G.Bi: "Split-radix algorithm for 2-D discrete Hartley transform", *Signal Processing*, vol.63, no.1, Jan.1998.
- [79] J.F.Boehme, D.Konig: "Statistical processing of car engine signals for combustion diagnostic", *Proc.IEEE 7th Workshop on statistical signal and array processing*, Quebec 1994, pp.369-374.
- [80] H.Bolcskei, F.Hlawatsch: "Discrete Zak transforms, polyphase transforms, and applications", *IEEE Trans.on Signal Processing*, vol.45, no.4, Apr.1997, pp.851-867.
- [81] H.Bolcskei, K.Grochening, F.Hlawatsch, H.G.Fiechtinger: "Oversampled Wilson expansion", *IEEE Sig.Proc.Let.*, vol.4, No.4, Apr.1997, pp.106-108.
- [82] G.F.Boudreaux-Bartels, T.W.Parks: "Time-varying filtering and signal estimation using the Wigner distribution", *IEEE Trans.Acoust., Speech, Signal Processing*, vol.ASSP-34, no.6, June 1986, pp.442-451.
- [83] G.F.Bourdeaux-Bartels: "Time-varying signal processing using Wigner distribution synthesis techniques", in *The Wigner Distribution-Theory and Applications in Signal Processing*, W.Mecklenbrauker, Ed, Amsterdam: Elsevier 1997.
- [84] G.F.Boudreaux-Bartels: "Time-frequency signal processing algorithms: analysis and synthesis using Wigner distribution", PhD dissertation, Rice University, Houston, Texas, Dec.1983.
- [85] G.F.Boudreaux-Bartels, P.J.Wiseman: "Wigner distributions analysis of acoustic well logs", *IEEE Int.Conf.ASSP*, Dallas, pp.2237-2240, 1987.
- [86] G.W.Braudaway, K.A.Magerlein, F.C.Mintzer: "Color correct digital watermarking of images", *U.S.Patent 5 530 759*, 1996.
- [87] A.Bultan, A.N.Akansu"Frames in rotated time-frequency planes", *Proc.IEEE ICASSP*, pp.1353-1356, 1999.
- [88] F.Cakrak, P.J.Loughlin: "Multiwindow time-varying spectrum with instantaneous bandwidth and frequency constraints", *IEEE Trans.on Signal Processing*, vol.49, no.8, Aug.2001, pp.1656-1666.
- [89] F.Cakrak, P.J.Loughlin: "Multiple window time-varying spectral analysis", *IEEE Trans.on Signal Processing*, vol.49, no.2, Feb.2001, pp.448-453.
- [90] R.A.Carmona, W.L.Hwang, B.Torresani:"Multiridge detection and time-frequency reconstruction", *IEEE Trans.on Signal Processing*, vol.47, no.2, Feb.1999, pp.480-492.
- [91] G.Caronni: "Assuring ownership rights for digital images", *Proc.Reliable IT Systems, VIS'95*.
- [92] L.-W.Chang: "Roundoff error problem of the Systolic Array for DFT", *IEEE Trans.on Signal Processing*, vol.41, no.1, Jan.1993, pp.395-398.
- [93] E.Chassande-Mottin, I.Daubecheis, F.Auger, P.Flandrin: "Differential reassignment", *IEEE Sig.Proc.Let.*, vol.4, No.10, Oct.1997, pp.293-294.

- [94] L.-P.Chau, Y.-H.Chan, W.-C.Sui: "Concurrent computation of two-dimensional discrete cosine transform", *Circuit, Systems, and Signal Processing*, vol.15, no.5, May 1996.
- [95] R.Cedric, L.Regis: "Joint recursive implementation of time-frequency representations and their modified version by the reassignment method", *Sig.Processing*, Vol.60, no.2, pp.163-179, 1997.
- [96] D.Chester: "Discrete Wigner implementations" in *Proc.Int.Symp.Circuits Syst.*, San Jose, CA, May 1986, pp.38-41.
- [97] H.C.Chiang, J.C.Liu: "High resolution time-frequency representations at arbitrary frequencies", *Signal Processing*, vol.68, no.3, Mar.1997.
- [98] H.Choi, W.J.Williams: "Improved time-frequency representation of multicomponent signals using exponential kernels", *IEEE Trans.Acoust., Speech, Signal Processing*, vol.ASSP-37, no.6, June 1989, pp.862-871.
- [99] Y.Chu, W.H.Fang: "An efficient approach for the harmonic retrieval problem via Haar wavelet transform", *IEEE Sig.Proc.Let.*, vol.4, No.12, Dec.1997, pp.331-333.
- [100] T.A.C.M.Claasen, W.F.G.Mecklenbrauker: "The Wigner distribution-a tool for time frequency signal analysis, Part I", *Phillips J.Res.*, vol.35, no.3, March 1980, pp.217-250.
- [101] T.A.C.M.Claasen, W.F.G.Mecklenbrauker: "The Wigner distribution-a tool for time frequency signal analysis, Part II", *Phillips J.Res.*, vol.35, no.4/5., April/May 1980, pp.276-300.
- [102] T.A.C.M.Claasen, W.F.G.Mecklenbrauker: "The Wigner distribution-a tool for time frequency signal analysis, Part III", *Phillips J.Res.*, vol.35, no.6, Jun 1980, pp.372-389.
- [103] T.A.C.M.Claasen, W.F.G.Mecklenbrauker: "The aliasing problem in discrete time Wigner distributions", *IEEE Trans.Acoust.Speech, Signal Processing*, vol.ASSP-31, no.5, Oct.1983, pp.1067-1072.
- [104] I.J.Clarke, G.Spence: "Detection and tracking of multi-periodic signals", *Proc.EURASIP'98*, vol.2, Sept.1998, Rhodes, pp.637-640.
- [105] M.Coates, W.Fitzgerald: "Time-frequency signal decomposition using energy mixture models", *Proc.IEEE ICASSP*, vol.2, pp.633 -636, 2000.
- [106] L.Cohen: "Generalized phase-space distribution functions", *J.of Math.Phys.*, vol.7, 1966, pp.781-786.
- [107] L.Cohen: "Time-frequency distributions-a review", *Proc.IEEE*, vol.77, no.7, July 1989, pp.941-981.
- [108] L.Cohen: "Distributions concentrated along the instantaneous frequency", *SPIE*, vol.1348, Advances Signal Proc., Algorithms, Architectures and Implementation, 1990, pp.149-157.
- [109] L.Cohen, *Time-frequency analysis*, Prentice-Hall, 1995.
- [110] L.Cohen, C.Lee: "Instantaneous bandwidth", in *Time-frequency signal analysis*, B.Boashash ed., Longman Cheshire,1992.
- [111] L.Cohen: "A general approach for obtaining joint representations in signal analysis - Part I: Characteristic function operator method", *IEEE Trans.on Signal Processing*, vol.44, no.5, May 1996, pp.1080-1091.
- [112] L.Cohen: "A general approach for obtaining joint representations in signal analysis - Part II: General class, mean and local values, and bandwidth", *IEEE Trans.on Signal Processing*, vol.44, no.5, May 1996, pp.1091-1099.
- [113] L.Cohen: "Time-frequency analysis", *Signal Processing Mag.*, January 1999, pp.22-28.
- [114] E.T.Copson: "Asymptotic expansions", *Cambridge University Press*, New York, 1967.
- [115] A.H.Costa, G.F.Boudreaux-Bartels: "A comparative study of alias-free time-frequency representations", *Proc.of IEEE-SP on TFTS Analysis*, Philadelphia, Pa, 1994, pp.76-79.
- [116] A.H.Costa, G.F.Boudreaux-Bartels: "Design of time-frequency representations using a multiform, tiltable exponential kernel", *IEEE Trans.on Signal Processing*, vol.43, no.10, Oct.1995, pp.2283-2302.
- [117] I.J.Cox, J.Kilian, T.Leighton, T.Shamoon: "Secure spread spectrum watermarking for multimedia", *IEEE Trans.on Image Processing*, vol.6, no.12, pp.1673-1687, 1997.
- [118] G.Cristobal, J.Bescos, J.Santamaria: "Image analysis through the Wigner distribution function", *Appl.Opt.*, vol.28, no.2, 1989, pp.262-271.

- [119] G.Cristobal, C.Gonzalo, J.Bescos: "Image filtering and analysis through the Wigner distribution function", in *Advances in Electronics and Electron Physics*, ed.P.W.Haekes, AcademicPress, Boston, MA, 1991.
- [120] G.S.Cunningham, W.J.Williams: "Vector-valued time-frequency representations", *IEEE Trans.on Signal Processing*, vol.44, no.7, July 1996, pp.1642-1657.
- [121] Z.Cvetković: "On discrete short-time Fourier analysis", *IEEE Trans.on Signal Processing*, vol.48, no.9, Sept.2000, pp.2628-2640.
- [122] R.N.Czerwinski, D.L.Jones: "Adaptive cone-kernel time-frequency analysis", *IEEE Trans.on Signal Processing*, vol.43, no.7, July 1995, pp.1715-1719.
- [123] R.N.Czerwinski, D.L.Jones: "Adaptive short-time Fourier analysis", *IEEE Sig.Proc.Let.*, vol.4, No.2, Feb.1997, pp.42-45.
- [124] M.Daković, V.N.Ivanović, L.J.Stanković: "On the S-method based instantaneous frequency estimation", in *Proc.7th Int.Symp.on Signal Processing and Its Applications*, vol.1, July 2003, pp.605-608.
- [125] I.Daubechies: "Ten lecture on wavelets", SIAM, Philadelphia, Pennsylvania, 1992.
- [126] M.Davy, B.Leprettre, C.Doncarli, N.Martin: "Tracking of spectral lines in an ARCAP time-frequency representation", *Proc.EURASIP'98*, vol.2, Sept.1998, Rhodes, pp.633-636.
- [127] M.Davy, C.Doncarli, G.F.Boudreaux-Bartels: "Improved optimization of time-frequency-based signal classifiers", *IEEE Sig.Proc.Let.*, vol.8, no.2, Feb.2001, pp.52-57.
- [128] M.Davy, A.Doucet: "Copulas: a new insight into positive time-frequency distributions", *IEEE Sig.Proc.Let.*, vol.10, no.7, July 2003, pp.215-218.
- [129] A.DeBrunner, M.Ozaydin, T.Przebinda:"Resolution in time-frequency", *IEEE Trans.on Signal Processing*, vol.47, no.3, Mar.1999, pp.783-788.
- [130] J.F.Delaigle, J.M.Boucq, J.J.Quisquater, B.Macq: "Digital images protection techniques in a broadcast framework: An overview", *Proc.of ECMAST'96*, vol.2, pp.711-727, 1996.
- [131] J.F.Delaigle, C.De Vleeschouwer, B.Macq: "Watermarking algorithm based on a human visual model", *Signal Processing*, Vol 66, No.3, 1998, pp.319-335.
- [132] N.Delpart, B.Escudie, P.Guillemain, R.Kronland-Martinet, P.Tchamitchian, B.Torresani: "Asymptotic wavelet and Gabor analysis: Extraction of instantaneous frequency", *IEEE Trans.on Information Theory*, vol.38, no.2, Feb./Mar.1992, pp.644-661.
- [133] C.De Luigi, E.Moreau: "An iterative algorithm for estimation of linear frequency modulated signal parameters", *IEEE Sig.Proc.Let.*, vol.9, no.4, April 2002, pp.127-129.
- [134] G.De Nicolao, G.Ferrari Trecate: "On the zeros of discrete-time linear periodic systems", *Circuit, Systems, and Signal Processing*, vol.16, no.6, June 1997.
- [135] C.S.Detka, A.El-Jaroudi: "The generalized evolutionary spectrum", *IEEE Trans.Sig.Proc.*, vol.44, no.11, November 1996, pp.2877-2881.
- [136] S.Dewitte, J.Cornelis: "Lossless integer wavelet transform", *IEEE Sig.Proc.Let.*, vol.4, No.6, Jun.1997, pp.158-160.
- [137] E.J.Diethorn: "The generalized exponential time-frequency distribution", *IEEE Trans.on Signal Processing*, vol.42, no.5, May 1994, pp.1028-1037.
- [138] I.Djurović, L.J.Stanković: "Virtual instrument for time-frequency analysis", *IEEE Trans.on Instrumentation and Measurements*.
- [139] I.Djurović, L.J.Stanković: "Time-frequency representation based on the reassigned S-method", *Signal Processing*, vol.77, no.1, Aug.1999, pp.115-120.
- [140] I.Djurović, L.J.Stanković: "Influence of high noise on the instantaneous frequency estimation using quadratic time-frequency distributions", *IEEE Sig.Proc.Let.*, vol.7, no.11, Nov.2000, pp.317-319.
- [141] I.Djurović, L.J.Stanković: "Robust Wigner distribution with application to the instantaneous frequency estimation", *IEEE Trans.on Signal Processing*, vol.49, no.12, Dec.2001, pp.2985-2993.
- [142] I.Djurović, L.J.Stanković, J.F.Bohme: "Robust L-estimation based forms of signal transforms and time-frequency representations", *IEEE Trans.on Signal Processing*, vol.51, no.7, July 2003, pp.1753-1761.
- [143] I.Djurović, V.Katkovnik, L.J.Stanković: "Instantaneous frequency estimation based on the robust spectrogram", *Proc.IEEE ICASSP*, vol.6, 2001, pp.3517-3520.

- [144] I.Djurović, L.J.Stanković: "Realization of robust filters in the frequency domain", *IEEE Sig.Proc.Let.*, vol.9, no.10, Oct.2002, pp.333-335.
- [145] I.Djurović, L.J.Stanković, M.J.Bastiaans: "Multidimensional reassignment method", in *Int.Conf.on Telecommunications in Modern Satellite, Cable and Broadcasting Service, TELSIKS*, vol.1, Sept.2001, pp.13-16.
- [146] I.Djurović, L.J.Stanković, J.F.Bohme: "Robust L-estimation based forms of signal transforms and time-frequency representations", *IEEE Trans.on Signal Processing*, vol.51, no.7, July 2003, pp.1753-1761.
- [147] I.Djurović, L.J.Stanković, J.F.Bohme: "Robust two-dimensional DFT", in *Proc.9th Int.Conf.on Electronics, Circuits and Systems*, vol.3, Sept.2002, pp.1011-1014.
- [148] I.Djurović, L.J.Stanković, S.Stanković, R.Stojanovic: "Local frequency estimation based on the Wigner distribution", in *Proc.Int.Conf.on Image Processing*, vol.3, Oct.2001, pp.736-739.
- [149] I.Djurović, S.Stanković: "Estimation of time-varying velocities of moving objects by time-frequency representations", *IEEE Trans on Image Processing*, vol.12, no.5, May 2003, pp.550-562.
- [150] I.Djurović, S.Stanković, A.Ohsumi, H.Ijima: "Estimation of line parameters using SLIDE algorithm and TF representations", in *Proc.9th Int.Conf.on Electronics, Circuits and Systems*, vol.3, Sept.2002, pp.1067-1070.
- [151] I.Djurović, S.Stanković, I.Pitas, L.J.Stanković, J.Tilp: "Generalization of the Fourier domain watermarking to the space/spatial-frequency domain", *Proc.IEEE IWISPA*, June 2000, pp.47-51.
- [152] I.Djurović, L.J.Stanković: "Non-paranietric IF and DOA estimation", in *Proc.7th Int.Symp.on Signal Processing and Its Applications*, vol.1, July 1-4, 2003, pp.149-152.
- [153] I.Djurović, L.J.Stanković, A.Ohsumi, H.Ijima: "Recursive realization of the robust STFT", in *Proc.7th Int.Symp.on Signal Processing and Its Applications*, vol.1, July 2003, pp.157-160.
- [154] D.L.Donoho, X.Huo: "Uncertainty principles and ideal atomic decomposition", *IEEE Trans.on Information Theory*, vol.47, no.7, Nov.2001, pp.2845-2862.
- [155] L.R.Dragonette, D.M.Drumheller, C.F.Gaumond, D.H.Hughes, B.T.O'Connor, N.C.Yen, T.J.Yoder: "The application of two-dimensional signal transformations to the analysis and synthesis of structural excitations observed acoustical scattering", *Proc.IEEE*, vol.84, no.9, Sept.1996, pp.1249-1263.
- [156] L.Durak, O.Arikan: "Short-time Fourier transform: two fundamental properties and an optimal implementation", *IEEE Trans.on Signal Processing*, vol.51, no.5, May 2003, pp.1231-1242.
- [157] P.J.Durka, D.Ircha, K.J.Blinowska: "Stochastic time-frequency dictionaries for matching pursuit", *IEEE Trans.on Signal Processing*, vol.49, no.3, March 2001, pp.507-510.
- [158] P.Duvaut, D.Declercq: "Statistical properties of the pseudo Wigner-Ville representation of normal random processes", *Signal Processing*, vol.75, no.1, May 1999.
- [159] A.El-Jaroudi, M.S.Redfern, L.F.Chaparro, J.M.Furman: "The application of time-frequency methods to the analysis of postural sway", *Proc.IEEE*, vol.84, no.9, Sept.1996, pp.1312-1318.
- [160] M.K.Emresoy, A.El-Jaroudi: "Iterative instantaneous frequency estimation and adaptive matched spectrogram", *Signal Processing*, vol.64, no.2, Feb.1997.
- [161] M.K.Emresoy, P.J.Loughlin: "Weighted least squares implementation of Cohen-Posh time-frequency distributions", *IEEE Trans.on Signal Processing*, vol.46, no.3, Mar.1998, pp.753-758.
- [162] J.S.Erkelens: "Autoregressive modelling for speech coding: Estimation, interpolation and quantization", *Ph.D.Dissertation, Delft University of Technology*, June 1996.
- [163] B.Escudie, J.Grea: "Sur une formulation generale de la representation en temps et frequence dans l' analyse de signaux d' energie finie", *C.R.Acad.Sci.Paris*, vol.A283, 1976, pp.1049-1051, (in French).
- [164] K.D.Feng, M.G.Amin, S.Tyler: "Analysis of the recursive multiple window STFTs and spectrograms", in *Proc.of the IEEE IS-TFTSA*, Philadelphia, Oct.1994, pp.72-75.
- [165] F. Zhang, G. Bi, Y. Chen: "Tomography time-frequency transform", *IEEE Trans. on Signal Processing*, vol. 50, no. 6, June 2002, pp.1289-1297.
- [166] P.Flandrin: "Some features of time-frequency representation of multicomponent signals" in *Proc.IEEE 1984 Int.Conf.Acoust., Speech, Signal Processing*, 1984, pp.41B.4.1-4.1.
- [167] P.Flandrin:" *Temps-frequence*", Paris, Hermes, 1993.

- [168] P.Flandrin, B.Escudie: "Time and frequency representation of finite energy signals: a physical property as a result of a Hilbertian condition", *Signal Processing*, vol.2, 1980, pp.93-100.
- [169] P.Flandrin, F.Hlawatsch: "Signal representation geometry and catastrophes in the time-frequency plane", in *Mathematics in Signal Processing*, T.Durrani et al eds., Oxford, U.K., Clarendon, 1987, pp.3-14.
- [170] P.Flandrin, W.Martin: "The Wigner-Ville spectrum of nonstationary random signals", in *The Wigner distribution: Theory and applications in signal processing*, Eds.W.Mecklenbrauker, F.Hlawatsch, pp.211-267.
- [171] P.Flandrin, W.Martin: "Pseudo-Wigner estimators for the analysis of nonstationary processes", in *Proc.IEEE Spectr.Est.Workshop II*, Tampa, FL, Nov.1983, pp.181-185.
- [172] P.Flandrin, O.Rioul: "Affine smoothing of the Wigner distribution", *Proc.IEEE IC-ASSP*, NM, April 1990, pp.2455-2458.
- [173] J.R.Fonollosa: "Positive time-frequency distributions based on joint marginal constraints", *IEEE Trans.on Signal Processing*, vol.44, no.8, Aug.1996, pp.2086-2092.
- [174] J.R.Fonollosa, C.L.Nikias: "Wigner higher order moment spectra: Definitions, properties, computation and application to transient signal analysis", *IEEE Trans.on Signal Processing*, vol.SP-41, pp.245-266, Jan.1993.
- [175] J.R.Fonollosa, C.L.Nikias: "Analysis of transient signals using higher order time-frequency distributions", *Proc.ICAASP 92*, pp.V 197-200.
- [176] A.Francos, M.Porat: "Analysis and synthesis of multicomponent signals using positive time-frequency distributions", *IEEE Trans.on Signal Processing*, vol.47, no.2, Feb.1999, pp.493-504.
- [177] B.Friedlander, J.M.Francos: "Estimation of amplitude and phase parameters of multicomponent signals", *IEEE Trans.on Signal Processing*, vol.43, no.4, April 1995, pp.917-927.
- [178] B.Friedlander, A.Zeira: "Oversampled Gabor representation for transient signals", *IEEE Trans.on Signal Processing*, vol.43, no.9, Sept.1995, pp.2088-2095.
- [179] J.M.Francos, B.Friedlander: "Bounds for estimation of multicomponent signals with random amplitude and deterministic phase", *IEEE Trans.on Signal Processing*, vol.43, no.5, May 1995, pp.1161-1173.
- [180] J.M.Francos, B.Friedlander: "Bounds for estimation of complex exponentials in unknown colored noise", *IEEE Trans.on Signal Processing*, vol.43, no.9, Sept.1995, pp.2176-2186.
- [181] D.Gabor: "Theory of communications", *J.Inst.Elect.Eng.*, vol.93, 1946, pp.423-457.
- [182] V.M.Gadre, R.K.Patney: "Using multirate architectures in realizing quadratic Volterra kernels", *IEEE Trans.on Signal Processing*, vol.44, no.11, Nov.1996, pp.2891-2895.
- [183] L.Galleani, L.L.Presti: "A time-frequency method for nonlinear system classification in presence of noise", *Proc.EURASIP'98*, Rhodes, vol.3, pp.1389-1392.
- [184] F.Galtier, O.Besson: "Analysis of a frequency estimator for a class of laser signals with time-varying amplitude", *IEE Proceedings: Radar, Sonar, and Navigation*, vol.145, no.2, Feb.1997.
- [185] F.M.Garcia, I.M.G.Lourtie, J.Buescu: "L2(R) nonstationary processes and the sampling theorem", *IEEE Sig.Proc.Let.*, vol.8, no.4, April 2001, pp.117-119.
- [186] L.M.Garth, Y.Bresler: "A comparison of optimized higher order spectral detection techniques for non-Gaussian signals", *IEEE Trans.on Signal Processing*, vol.44, no.5, May 1996, pp.1198-1214.
- [187] K.L.Gaston, D.J.Nelson: "Exploiting local STFT properties", *Proc.IEEE ICASSP*, vol.1, pp.97-100, 2000.
- [188] G.C.Gaunaurd, H.C.Strifors: "Signal analysis by means of time-frequency (Wigner-Type) distributions - Applications to sonar and radar echoes", *Proc.IEEE*, vol.84, no.9, Sept, pp.1231-1248.
- [189] N.L.Gerr: "Introducing a third order Wigner distribution", *Proc.IEEE*, vol.76, no.3, Mar.1988, pp.290-292.
- [190] A.B.Gershman, M.G.Amin: "Wideband direction-of-arrival estimation of multiple chirp signals using spatial time-frequency distributions", *IEEE Sig.Proc.Let.*, vol.7, no.6, June 2000, pp.152-155.
- [191] A.B.Gershman, M.Pesavento, M.G.Amin: "Estimating parameters of multiple wideband polynomial-phase sources in sensor arrays", *IEEE Trans.on Signal Processing*, vol.49, no.12, Dec.2001, pp.2924-2934.

- [192] B.W.Gillespie, L.E.Atlas: "Optimizing time-frequency kernels for classification", *IEEE Trans.on Signal Processing*, vol.49, no.3, March 2001, pp.485-496.
- [193] J.-M.Girault, D.Kouame: "Length and frequency of band-limited signals", *IEEE Sig.Proc.Let.*, vol.9, no.11, Nov.2002, pp.371-374.
- [194] S.Golden, B.Friedlander: "A modification of the discrete polynomial transform", *IEEE Trans.on Signal Processing*, vol.46, no.5, May 1998, pp.1452-1456.
- [195] A.Goldenshluger, A.Nemirovski: "On spatial adaptive estimation of nonparametric regression", *Res.report*, 5/94, Technion, Israel, Nov.1994.
- [196] P.Goncalves, R.G.Baraniuk: "A pseudo Bertrand distribution for time-scale analysis", *IEEE Signal Processing Letters*, vol.3, no.3, Mar.1996, pp.82-84.
- [197] P.Goncalves, R.G.Baraniuk: "Pseudo affine Wigner distributions: Definition and kernel formulation", *IEEE Trans.on Signal Processing*, vol.46, no.6, June 1998, pp.1505-1517.
- [198] E.Grall-Maes, P.Beausery: "Mutual information-based feature extraction on the time-frequency plane", *IEEE Trans.on Signal Processing*, vol.50, no.4, April 2002, pp.779-790.
- [199] R.M.Gray, J.W.Goodman, *Fourier transforms*, Kluwer Academic Publishers, 1995.
- [200] D.Groutage: "A fast algorithm for computing minimum cross-entropy positive time-frequency distributions", *IEEE Trans.on Signal Processing*, vol.45, no.8, Aug.1997, pp.1954-1971.
- [201] D.Groutage, D.Bennink: "Feature sets for nonstationary signals derived from moments of the singular value decomposition of Cohen-Posch, (positive time-frequency) distributions", *IEEE Trans.on Signal Processing*, vol.48, no.5, May 2000, pp.1498-1503.
- [202] H.Gu: "Ambiguity function and Cramer-Rao bound in the multisignal case", *IEE Proceedings: Radar, Sonar and Navigation*, vol.143, no.4, Mar.1997.
- [203] H.Guo, G.A.Sitton, C.S.Burrus: "The quick Fourier transform: An FFT based on symmetries", *IEEE Trans.on Signal Processing*, vol.46, no.2, Feb.1998, pp.335-342.
- [204] I. B. Gwan: A.Papandreou-Suppappola, G.F.Boudreaux-Bartels: "Wideband Weyl symbols for dispersive time-varying processing of systems and random signals", *IEEE Trans.on Signal Processing*, vol.50, no.5, May 2002, pp.1077-1090.
- [205] S.L.Hahn, K.M.Snopek: "Double-dimensional distributions: another approach to "quartic" distributions", *IEEE Trans.on Signal Processing*, vol.50, no.12, Dec.2002, pp.2987-2997.
- [206] L.Hamila, F.A.Cheikh, J.Vesma, J.Astola, M.Gabbouj: "Relationship between Wigner distribution and the teager energy", *Proc.EURASIP'98*, Rhodes, vol.3, pp.1857-1860.
- [207] A.Hanssen, L.L.Scharf: "A theory of polyspectra for nonstationary stochastic processes", *IEEE Trans.on Signal Processing*, vol.51, no.5, May 2003, pp.1243-1252.
- [208] F.Hartung, B.Girot Bernd: "Watermarking of uncompressed and compressed video", *Signal Processing*, Vol.66, No.3, 1998, pp.283-301.
- [209] S.Haykin, R.J.Racine, Y.Xu, C.A.Chapman: "monitoring neuronal oscillations and signal transmission between cortical regions using time-frequency analysis of electroencephalographic activity", *Proc.IEEE*, vol.84, no.9, Sept.1996, pp.1295-1311.
- [210] S.B.Hearon, M.G.Amin: "Minimum-variance time-frequency distribution kernels", *IEEE Trans.on Signal Processing*, vol.43, no.5, May 1995, pp.1258-1262.
- [211] C.Herley, J. Kovačević, K.Ramchandaran, M.Vetterli: "Tilings of the time-frequency plane: Construction of arbitrary orthogonal bases and fast tiling algorithms", *IEEE Trans.on.Sig.Proc.*, vol.41, no.12, December 1993, pp.3341-3359.
- [212] M.J.Hinich, H.Messer: "On the principal domain of the discrete bispectrum of a stationary signal", *IEEE Trans.on Signal Processing*, vol.43, no.9, Sept.1995, pp.2130-21335.
- [213] F.Hlawatsch: "Interference terms in the Wigner distribution", in *Proc.1984 Int.Conf.Digital Signal Processing-84*, V.Cappellini et al., Eds., North-Holland, 1984, pp.363-367.
- [214] F.Hlawatsch: "Duality and classification of bilinear time-frequency signal representation", *IEEE Trans.on Signal Processing*, vol.39, July 1991, pp.1564-1574.
- [215] F.Hlawatsch, H.Bolcskei: "Covariant time-frequency distributions on conjugate operators", *IEEE Sig.Proc.Let.*, vol.3, No.2, Feb.1996, pp.44-46.
- [216] F.Hlawatsch, G.F.Boudreaux-Bartels: "Linear and quadratic time-frequency signal representations", *IEEE Signal Processing Magazine*, April 1992, pp.21-67.

- [217] F.Hlawatsch, P.Flandrin: "The interference structure of Wigner distribution and related time-frequency signal representations", in *The Wigner Distribution-Theory and Applications in Signal Processing*, W.Mecklenbrauker, Ed, Amsterdam: Elsevier Science 1992.
- [218] F.Hlawatsch, W.Kozek: "Time-frequency analysis of linear signal spaces", *Proc.Int.Conf.ASSP*, Toronto (Canada), May 1991, pp.2045-2048.
- [219] F.Hlawatsch, W.Kozek: "Time-frequency projection filters and time-frequency signal expansions", *IEEE Trans.on Signal Processing*, vol.42, no.12, Dec.1994
- [220] F.Hlawatsch, W.Krattenthaler: "Two signal synthesis algorithms for pseudo Wigner distribution", in *Proc.IEEE 1988 Int.Conf.Acoust., Speech, Signal Processing (ICASSP-88)*, New York, Apr.1988, pp.1550-1553.
- [221] F.Hlawatsch, W.Krattenthaler: "A new approach to time-frequency signal decomposition", in *IEEE 1989 Int.Symp.Circuits and Systems (ISCAS-89)*, Portland, OR, May 1989, pp.1248-1251.
- [222] F.Hlawatsch, W.Krattenthaler: "Phase matching algorithms for Wigner-distribution signal synthesis", *IEEE Trans.on Signal Processing*, vol.39, no.3, Mar.1991, pp.612-619.
- [223] F.Hlawatsch, W.Krattenthaler: "Bilinear signal synthesis", *IEEE Trans.on Signal Processing*, vol.40, no.2, Feb.1992, pp.352-363.
- [224] F.Hlawatsch, W.Krattenthaler: "Signal synthesis algorithms for bilinear time-frequency signal representations", in *The Wigner Distribution-Theory and Applications in Signal Processing*, W.Mecklenbrauker, Ed, Amsterdam: Elsevier 1997.
- [225] F.Hlawatsch, A.Papandreou-Suppappola, G.F.Boudreaux-Bartels: "The hyperbolic class of quadratic time-frequency representations - Part II: Subclasses, intersection with the affine and power classes, regularity, and unitarity", *IEEE Trans.on Signal Processing*, vol.45, no.2, Feb.1997, pp.303-316.
- [226] F.Hlawatsch, G.Matz, H.Kirchauer, W.Kozek: "Time-frequency formulation, design, and implementation of time-varying optimal filters for signal estimation", *IEEE Trans.on Signal Processing*, vol.48, no.5, May 2000, pp.1417-1432.
- [227] J.Hormigo, G.Cristobal: "High resolution spectral analysis of images using the pseudo-Wigner distribution", *IEEE Trans.on Signal Processing*, vol.46, no.6, June 1998, pp.1757-1763.
- [228] C.Hory, N.Martin, A.Chehikian: "Spectrogram segmentation by means of statistical features for non-stationary signal interpretation", *IEEE Trans.on Signal Processing*, vol.50, no.12, Dec.2002, pp.2915-2925.
- [229] A.N.Hossen, U.Heute, O.V.Shentov, S.K.Mitra: "Subband DFT - part II: Accuracy, complexity, and applications", *Signal Processing*, vol.41, no.3, Mar.1996.
- [230] Y.Hua, H.Yang: "High SNR perturbation in single 2-D frequency estimate using matrix pencil", *IEEE Trans.on Signal Processing*, vol.43, no.5, May 1995, pp.1291-1293.
- [231] Z.M.Hussain, B.Boashash: "Adaptive instantaneous frequency estimation of multicomponent FM signals using quadratic time-frequency distributions", *IEEE Trans.on Signal Processing*, vol.50, no.8, Aug.2002, pp.1866-1876.
- [232] Q.Q.Huynh, L.N.Cooper, N.Intrator, H.Shouval: "Classification of underwater mammals using feature extraction based on time-frequency analysis and BCM theory", *IEEE Trans.on Signal Processing*, vol.46, no.5, May 1998, pp.1202-1208.
- [233] B.G.Iem, A.Papandreou-Suppappola, G.F.Boudreaux-Bartels:"New time-frequency symbol classification", *Proc.IEEE ICASSP*, pp.1345-1348, 1999.
- [234] B.G.Iem, A.Papandreou-Suppappola, G.F.Boudreaux-Bartels.: "Classes of smoothed Weyl symbols", *IEEE Sig.Proc.Let.*, vol.7, no.7, July 2000, pp.186-188.
- [235] H.Ijima, A.Ohsumi, H.Sato, I.Djurović: "Maximum likelihood estimation for signal parameters using pseudo-Wigner distribution", in *Proc.of the 41st SICE Annual Conference*, vol.3, 5-7 Aug.2002, pp.1464-1469.
- [236] V.K.Ingle, J.G.Proakis, *Digital signal processing using MATLAB V.4*, PWS Publishers, 1996.
- [237] V.Ivanović, L.J.Stanković, D.Petranović: "Finite word-length effects in implementation of distributions for time-frequency signal analysis", *IEEE Trans.on Signal Processing*, vol.46, no.7, July 1998, pp.2035-2041.

- [238] V.N.Ivanović, M.Daković, L.J.Stanković: "Performance of quadratic time-frequency distributions as instantaneous frequency estimators", *IEEE Trans.on Signal Processing*, vol.51, no.1, Jan.2003, pp.77-89.
- [239] V.N.Ivanović, M.Daković, I.Djurović, L.J.Stanković: "Instantaneous frequency estimation by using time-frequency distributions", *Proc.IEEE ICASSP*, vol.6, 2001, pp.3521-3524.
- [240] V.N.Ivanović, M.Daković, L.J.Stanković: "Performance of quadratic time-frequency distributions as instantaneous frequency estimators", *IEEE Trans.on Signal Processing*, vol.51, no.1, Jan.2003, pp.77-89.
- [241] L.Jacobson, H.Wechsler: "Joint spatial/spatial-frequency representation", *Signal Processing*, vol.14, 1988, pp.37-68.
- [242] A.J.E.M.Janssen: "On the locus and spread of pseudo density functions in the time-frequency plane", *Phillips Journal of Research*, vol.37, 1982, pp.79-110.
- [243] A.J.E.M.Janssen: "The Zak transform: A signal transform for sampled time-continuous signals", *Philips Journal of Research*, vol.43, 1988, pp.23-69.
- [244] A.J.E.M.Janssen: "Wigner weight functions and Weyl symbols of nonnegative definite linear operators", *Philips J.Res.*, vol.44, 1989, pp.7-42.
- [245] J.Jeong, G.S.Cunningham, W.J.Williams: "The discrete-time phase derivative as a definition of discrete instantaneous frequency and its relation to discrete time-frequency distributions", *IEEE Trans.on Signal Processing*, vol.43, no.1, Jan.1995, pp.341-344.
- [246] J.Jeong, W.J.Williams: "Kernel design for reduced interference distributions", *IEEE Trans.on Signal Processing*, vol.40, no.2, Feb.1992, pp.402-412.
- [247] J.Jeong, W.J.Williams: "Mechanism of the cross-terms in spectrograms", *IEEE Trans.on SP*, vol.40, no.10, Oct.1992, pp.2608-2613.
- [248] J.Jeong,W.J.Williams: "Alias-free generalized discrete-time time-frequency distributions", *IEEE Trans.Signal Processing*, vol.40, no.11, Nov.1992, pp.2757-2765.
- [249] J.A.Johnston: "Wigner distribution and FM radar signal design", *IEE Proc.Part F*, vol.136, no.2, Apr.1989, pp.81-87.
- [250] D.L.Jones, R.G.Baraniuk: "An adaptive optimal-kernel time-frequency representation", *IEEE Trans.on Signal Processing*, vol.43, no.10, Oct.1995, pp.2361-2372.
- [251] D.L.Jones, T.W.Parks: "A high resolution data-adaptive time-frequency representation", *IEEE Trans.on Signal Processing*, vol.38, no.12, Dec.1990, pp.2127-2135.
- [252] S.Joshi, J.M.Morris: "On a novel critically-sampled discrete-time Gabor transform", *Signal Processing*, vol.61, no.1, Jan.1997.
- [253] S.Kadambe: "The application of time-frequency and time-scale representations for speech analysis", PhD Dissertation, Univ.Rhode Island, Kingston 1991.
- [254] S.Kadambe, G.F.Boudreaux-Bartels: "A comparison of the existence of 'cross terms' in the Wigner distribution and the squared magnitude of the Wavelet transform and Short-time Fourier transform", *IEEE Trans.on Signal Processing*, vol.40, no.10, Oct.1992, pp.2498-2517.
- [255] S.Kadambe, G.F.Boudreaux-Bartels: "A comparison of wavelet functions for pitch detection of speech signals", *Proc.Int.Conf.ASSP*, May 1991, pp.449-452.
- [256] A.Kaderli, A.S.Kayhan: "A spectral matching approach for parameter and spectral estimation of nonstationary rational processes", *IEEE Trans.on Signal Processing*, vol.49, no.10, Oct.2001, pp.2223-2231.
- [257] V.Katkovnik: "A new form of the Fourier transform for time-frequency estimation", *Signal Processing*, vol.47, no.2, 1995, pp.187-200.
- [258] V.Katkovnik: "Local polynomial periodogram for time-varying frequency estimation", *South African Statst.J.*, vol.29, no.2, 1995, pp.169-198.
- [259] V.Katkovnik: "Local polynomial approximation of the instantaneous frequency: Asymptotic accuracy", *Signal Processing*, vol.52, no.3, Mar.1996.
- [260] V.Katkovnik: "Adaptive local polynomial periodogram for time-varying frequency estimation", *Proc.IEEE-SP on TFTS Analysis*, Paris, June 1996, pp.329-332.
- [261] V.Katkovnik: "Nonparametric estimation of the instantaneous frequency", *IEEE Trans.on Information Theory*, vol.43, no.1, Jan.1997, pp.183-189.

- [262] V.Katkovnik: "Discrete-time local polynomial approximation of the instantaneous frequency", *IEEE Trans.on Signal Processing*, vol.46, no.10, Oct.1998, pp.2626-2638.
- [263] V.Katkovnik, L.J.Stanković: "Instantaneous frequency estimation using the Wigner distribution with varying and data-driven window length", *IEEE Trans.on Signal Processing*, vol.46, no.9, Sept.1998, pp.2315-2326.
- [264] V.Katkovnik and L.J.Stanković, "Periodogram with varying and data-driven window length", *Signal Processing*, vol.67, N3, 1998, pp.345-358.
- [265] V.Katkovnik, I.Djurović, L.L.J.Stanković: "Robust time-frequency distributions", in *6th Int.Symp.on Signal Processing and its Applications*, vol.1, Aug.2001, pp.156-157.
- [266] V.Katkovnik, L.J.Stanković: "High-resolution data-adaptive time-frequency analysis", in *Proc.9th Int.Conf.on Electronics, Circuits and Systems*, vol.3, Sept.2002, pp.1023-1026.
- [267] A.S.Kayhan: "Difference equation representation of chirp signals and instantaneous frequency/amplitude estimation", *IEEE Trans.on Signal Processing*, vol.44, no.12, Dec.1996, pp.2948-2959.
- [268] Y.Kim: "Efficient signal processing techniques for space time adaptive radar", *Ph.D.Dissertation, Polytechnic University of Brooklyn*, Dec.1997.
- [269] H.Kirchauer, F.Hlawatsch, W.Kozek: "Time-frequency formulation and design of nonstationary Wiener filters", in *Proc.Int.Conf.Acoust., Speech, Signal Processing*, 1995, pp.1549-1552.
- [270] L.Knockaert: "A class of positive isentropic time-frequency distributions", *IEEE Sig.Proc.Let.*, vol.9, no.1, Jan.2002, pp.22-25.
- [271] D.Konig, J.F.Bohme: "Wigner-Ville spectral analysis of automotive signals captured at knock", *Applied Signal Processing*, 3:54-64, 1996.
- [272] B.D.Kovačević, J.M.Milosavljenoc, M.Dj.Veinovic: "Robust recursive AR speech analysis", *Signal Processing*, vol.44, no.2, Feb.1995.
- [273] J.Kovačević, M.Vetterli: "Non-separable multidimensional perfect reconstruction filter banks and wavelet bases for \mathbb{R}^n ", *IEEE Trans.on Information theory*, vol.38, pp.533-555, Mar.1992.
- [274] J.Kovačević, M.Vetterli: "FCO sampling of digital video using perfect reconstruction filter banks", *IEEE Trans.Image Processing*, vol.2, pp.118-122, Jan.1993.
- [275] J.Kovačević, M.Vetterli: "Nonseparable two- and three-dimensional wavelets", *IEEE Trans.on Signal Processing*, vol.43, no.5, pp.1269-1273, May 1995.
- [276] W.Kozek: "Time-frequency signal processing based on the Wigner-Weyl framework", *Signal Processing*, vol.29, no.1, Oct.1992, pp.77-92.
- [277] W.Kozek, F.Hlawatsch: "Time-frequency representation of linear time-varying systems using the Weyl symbol", in *Proc.6th Int.Conf.on Digital Processing of Signals in Communication*, Loughborough, UK, Sept.1991, pp.25-30.
- [278] W.Krattenthaler: "Signal synthesis algorithms for non-smoothed and smoothed Wigner distributions", *Ph.D.dissertation*, Technische Universität Wien, Vienna, Austria, Feb.1990.
- [279] W.Krattenthaler, F.Hlawatsch: "general signal synthesis algorithms for smoothed versions of Wigner distribution", in *Proc.IEEE 1990 Int.Conf.Acoust., Speech, Signal Processing (ICASSP-90)*, Albuquerque,NM, Apr.1990, pp.1611-1614.
- [280] W.Krattenthaler, F.Hlawatsch: "Time-frequency design and processing of signals via smoother Wigner distributions", *IEEE Trans.on Signal Processing*, vol.41, no.1, Jan.1993, pp.278-287.
- [281] P.K.Kumar, K.M.M.Prabhu: "Simulation studies of moving target detection: A new approach with Wigner-Ville distribution", *IEE Proceedings: Radar, Sonar, and Navigation*, vol.144, no.5, May 1998.
- [282] R.Kumaresan, A.Rao: "On minimum/maximum/all-pass decompositions in time and frequency domains", *IEEE Trans.on Signal Processing*, vol.48, no.10, Oct.2000, pp.2973-2976.
- [283] D.Kundu: "Estimating the number of sinusoids in additive white noise", *Signal Processing*, vol.56, no.1, Jan.1997.
- [284] D.Kundur, D.Hatzinakos: "A robust digital image watermarking method using wavelet-based fusion", *Proc.of ICIP'97*, Santa Barbara, CA, USA, Oct.1997, Vol.I, pp.544-547.
- [285] H.K.Kwok, D.L.Jones: "Improved instantaneous frequency estimation using an adaptive short-time Fourier transform", *IEEE Trans.on Signal Processing*, vol.48, no.10, Oct.2000, pp.2964-2972.

- [286] H.Laurent, C.Doncarli: "Stationarity index for abrupt changes detection in the time-frequency plane", *IEEE Sig.Proc.Let.*, vol.5, No.2, Feb..1998, pp.43-45.
- [287] J.C.Liu, H.C.Chiang: "Fast Computation of high resolution Hartley transform at arbitrary frequencies", *Signal Processing*, vol.44, no.2, Feb.1995.
- [288] X. Liu, N.D.Sidiropoulos, A.Swami: "Blind high-resolution localization and tracking of multiple frequency ho, pped signals", *IEEE Trans.on Signal Processing*, vol.50, no.4, April 2002, pp.889-901.
- [289] Y.Lu, J.M.Morris: "Fast computation of Gabor functions", *IEEE Sig.Proc.Let.*, vol.3, No.3, Mar.1996, pp.75-78.
- [290] T.Le, M.Glesner: "A flexible and approximate computing approach for time-frequency distributions ", *IEEE Trans.on Signal Processing*, vol.48, no.4, April 2000, pp.1193-1196.
- [291] P.Lee, G.S.Liu: "An efficient algorithm for the 2-D discrete cosine transform", *Signal Processing*, vol.55, no.2, Feb.1997.
- [292] B.Leprettre, N.Martin, F.Glanceaud, J.-P.Navarre: "Three-component signal recognition using time, time-frequency, and polarization information - Application to seismic detection of avalanches", *IEEE Trans.on Signal Processing*, vol.46, no.1, Jan.1998, pp.83-103.
- [293] T.Le, T.Dombek, M.Glesner: "Sound signature analysis using time-frequency signal processing: Application to active stall avoidance in axial compressors", *Proc.EURASIP'98*, vol.2, Sept.1998, Rhodes, pp.641-644.
- [294] A.R.Leyman, Z.M.Kamran, K.Abed-Meraim,: "Higher-order time frequency-based blind source separation technique", *IEEE Sig.Proc.Let.*, vol.7, no.7, July 2000, pp.193-196.
- [295] P.Li, J.Sun, B.Yu: "A new method for two-dimensional array signal processing in unknown noise environment", *Signal Processing*, vol.47, no.3, Mar.1996.
- [296] S.Li, S.Qian: "A complement to a derivation of discrete Gabor expansions", *IEEE Sig.Proc.Let.*, vol.2, No.2, Feb.1995, pp.31-33.
- [297] K.J.R.Liu: "Novel parallel architecture for short time Fourier transform", *IEEE Trans.on Circuits and Systems II*, vol.40, no.12, Dec.1993, pp.786-789.
- [298] P.J.Loughlin: "Comments on scale invariance of time-frequency distributions", *IEEE Sig.Proc.Let.*, vol.2, No.12, Dec.1995, pp.217-218.
- [299] P.J.Loughlin, J.Pitton, B.Hannaford: "Approximating time-frequency density functions via optimal combinations of spectrograms", *IEEE Sig.Proc.Let.*, vol.1, No.12, Dec.1994, pp.199-202.
- [300] P.J.Loughlin, B.Tacer: "Comments on the interpretation of instantaneous frequency", *IEEE Sig.Proc.Let.*, vol.4, No.5, May 1997, pp.123-125.
- [301] P.J.Loughlin, K.L.Davidson: "Instantaneous kurtosis", *IEEE Sig.Proc.Let.*, vol.7, no.6, June 2000, pp.156-159.
- [302] P.J.Loughlin, K.L.Davidson: "Modified Cohen-Lee time-frequency distributions and instantaneous bandwidth of multicomponent signals", *IEEE Trans.on Signal Processing*, vol.49, no.6, June 2001, pp.1153-1165.
- [303] C.Lu, S.Joshi, J.Morris: "Parallel lattice structure of bloc time-recursive generalized Gabor transforms", *Signal Processing*, vol.57, no.2, Feb.1997.
- [304] S.Lu, P.C.Doerschuk: "Nonlinear modeling and processing of speech based on sums of AM-FM formant models", *IEEE Trans.on Signal Processing*, vol.44, no.4, Apr.1996, pp.773-783.
- [305] Y.Lu, J.M.Morris: "Some results on discrete Gabor transforms for finite periodic sequences", *IEEE Trans.on Signal Processing*, vol.46, no.6, June 1998, pp.1703-1708.
- [306] Y.Lu, J.Morris, H.G.Feichtinger: "On a complementary to derivation of discrete Gabor expansions", *IEEE Sig.Proc.Let.*, vol.4, No.1, Jan.1997, pp.12-14.
- [307] N.Ma, D.Vray, Ph.Delacharte, G.Gimenez: "Time-frequency representation of multicomponent chirp signals", *Signal Processing*, vol.56, no.2, Feb.1996.
- [308] X.Ma, C.L.Nikias: "Joint estimation of time delay and frequency delay in impulsive noise using fractional lower order statistics", *IEEE Trans.on Signal Processing*, vol.44, no.11, Nov.1996, pp.2669-2688.
- [309] B.Macq, J.J.Quisquater: "Cryptology for digital TV broadcasting", *Proc.IEEE*, vol.83, no.6, pp.944-957, 1995.

- [310] N.H.Morgan, A.S.Gevins: "Wigner distributions of human event-related brain potentials", *IEEE Trans.on Biomedical engineering*, vol.33, no.1, Jan 1986, pp.66-70.
- [311] S.Mann, S.Haykin: "The chirplet transform: Physical considerations", vol.43, no.11, November 1995, pp.2745-2761.
- [312] N.M.Marinovic: "The Wigner distribution and the ambiguity function: generalizations, enhancement, compression and some applications", PhD dissertation, the City University of New York, 1986.
- [313] N.M.Marinovic, W.A.Smith: "Application of joint time-frequency to ultrasonic transducers", *ISCAS-86*, pp.50-54, 1986.
- [314] W.Martin, P.Flandrin: "Wigner-Will spectral analysis of nonstationary processes", *IEEE Trans.on ASSP*, vol.33, no.6, Dec.1985, pp.1461-1470.
- [315] C.Marven, G.Ewers, *A simple approach to Digital Signal Processing*, Wiley, 1996.
- [316] G.Matz, F.Hlawatsch, W.Kozek: "Generalized evolutionary spectral analysis and the Weyl spectrum of nonstationary random processes", *IEEE Trans.on Signal Processing*, vol.45, no.6, June 1997, pp.1520-1534.
- [317] G.Matz, F.Hlawatsch: "Minimax robust time-frequency filters for nonstationary signal estimation", *Proc.IEEE ICASSP*, pp.1329-1332, 1999.
- [318] W.F.G.Mecklenbrauker, F.Hlawatsch Eds: "The Wigner distributions - theory and applications in signal processing", Elsevier, 1997.
- [319] J.M.Mendel: "Tutorial on higher-order statistics (spectra) in signal processing and system theory: Theoretical results and some applications", *IEEE Proc.*, vol.79, no.3, Mar.1991, pp.278-305.
- [320] S.K.Mitra, *Digital Signal Processing: A computer based approach*, McGraw-Hill, 1996.
- [321] D.F.Mix, *Random Signal Processing*, Prentice Hall, 1995.
- [322] J.M.Morris, D.Wu: "On alias-free formulations of discrete-time Cohen's class of distributions", *IEEE Trans.on Signal Processing*, vol.44, no.6, June 1996, pp.1355-1365.
- [323] W. Mu, M.G.Amin: "SNR analysis of time-frequency distributions", *Proc.IEEE ICASSP*, vol.2, pp.645 -648, 2000.
- [324] W. Mu, M.G. Amin, Y. Zhang: "Bilinear signal synthesis in array processing", *IEEE Trans. on Signal Processing*, vol. 51, no. 1, Jan. 2003, pp.90-100.
- [325] S.W. Nam, E.J.Powers: "Volterra series representation of time-frequency distributions", *IEEE Trans.on Signal Processing*, vol.51, no.6, June2003, pp.1532-1537.
- [326] W.Nanacara, Y.K.Yaz: "Linear and nonlinear estimation with uncertain algorithm", *Signal Processing*, vol.62, no.2, Feb.1997.
- [327] K.Narayan, E.Kersch, S.S.Rao, Y.Kresh: "Constrained ECG compression using best adapted wavelet packet bases", *IEEE Sig.Proc.Let.*, vol.3, No.10, Oct.1996, pp.273-275.
- [328] J.L.Navarro-Mesa, E.Lleida-Solano, A.Moreno-Bilbao: "A new method for epoch detection based on the Cohen's class of time frequency representations", *IEEE Sig.Proc.Let.*, vol.8, no.8, Aug.2001, pp.225-227.
- [329] T.L.Nguyen, B.Senadji: "Detection of frequency modulated signals in Rayleigh fading channels based on time-frequency distributions", *Proc.IEEE ICASSP*, vol.2, pp.729-732, 2000.
- [330] L.R.Neira, A.G.Constantinides: "Power spectrum estimation from noisy and limited autocorrelation values.A maximum entropy approach", *Signal Processing*, vol.56, no.2, Feb.1996.
- [331] S.R.Nelatury, B.G.Mobasserri: "Synthesis of discrete-time discrete-frequency Wigner distribution", *IEEE Sig.Proc.Let.*, vol.10, no.8, Aug.2003, pp.221-224.
- [332] G.Nicchiotti, E.Ottaviani: "Non-invertible statistical wavelet watermarking", *Proc.int.conf.IEEE ASSP, Munich'97*, pp.2289-2292, May 1997.
- [333] N.Nikolaidis, I.Pitas, Robust image watermarking in the spatial domain, *Signal Processing* Vol.66, No.3, 1998 pp.385-403
- [334] A.H.Nutall: "Signal Processing studies", *Technical report*, NUSC, New London, CT, 1989.
- [335] S.Oh, R.J.Marks II: "Some properties of generalized time-frequency representation with cone-shaped kernels", *IEEE Trans.on Signal Processing*, vol.40, no.7, July 1992, pp.1735-1745.
- [336] J.R.O'Hair, B.W.Suter: "The Zak transform and decimated time-frequency distributions", *IEEE Trans.on Signal Processing*, vol.44, no.5, May 1996, pp.1099-1111.

- [337] J.C.O'Neill, W.J.Williams: "Shift covariant time-frequency distributions of discrete signals", *IEEE Trans.on Signal Processing*, vol.47, no.1, Jan.1999, pp.133-146.
- [338] J.C.O'Neill, W.J.Williams: "A function of time, frequency, lag and Doppler", *IEEE Trans.on Signal Processing*, vol.47, no.3, Mar.1999, pp.1789-799.
- [339] J.C.O'Neill, P.Flandrin,: "Virtues and vices of quartic time-frequency distributions", *IEEE Trans.on Signal Processing*, vol.48, no.9, Sept.2000, pp.2641-2650.
- [340] L.Onural, M.F.Erden, H.M.Ozatkas: "Extensions to common Laplace transformations", *IEEE Sig.Proc.Let.*, vol.4, No.11, Nov.1997, pp.310-312.
- [341] A.V.Oppenheim, R.W.Schafer, *Digital signal processing*, Prentice-Hall, New Jersey,1975.
- [342] R.S.Orr: "Computational assessment of Gabor representations", in *Proc.IEEE ICASSP'91*, vol.3, May 1991, pp.2217-2220.
- [343] R.S.Orr: "The order of computation of finite discrete Gabor transform", *IEEE Trans.on Signal Processing*, vol.41, no.1, Jan.1993, pp.122-130.
- [344] J.O'Ruanaidh, W.Dowling, F.Boland: "Phase watermarking of digital images", *Proc.1996 IEEE Int.Conf.on Image Processing (ICIP'96)*, Vol.III, pp.239-242.
- [345] J.O'Ruanaidh, W.Dowling, F.Boland: "Watermarking digital images for copyright protection", *IEE Proc.on Vision, Image and Signal Processing*, vol.143, No.4, pp.250-256, August 1996.
- [346] J.O'Ruanaidh, T.Pun: "Rotation, scale, and translation invariant digital image watermarking", *Proc.of ICIP'97*, Santa Barbara, CA, USA, Oct.1997, Vol.I, pp.536-539.
- [347] J.O'Ruanaidh, T.Pun: "Rotation, scale and translation invariant spread spectrum digital image watermarking", *Signal Processing*, Vol.66, No.3, 1998, pp.303-317.
- [348] P.O'Shea: "A new technique for instantaneous frequency rate estimation", *IEEE Sig.Proc.Let.*, vol.9, no.8, Aug.2002, pp.251-252.
- [349] X.Ouyang, M.G.Amin: "Short-time Fourier transform receiver for nonstationary interference excision in direct sequence spread spectrum communications", *IEEE Trans.on Signal Processing*, vol.49, no.4, April 2001, pp.851-863.
- [350] H.M.Ozaktas, O.Arikan, M.A.Kutay, G.Bozdagi: "Digital computation of the fractional Fourier transform", *IEEE Trans.on Signal Processing*, vol.44, no.9, Sept.1996, pp.2141-2151.
- [351] H.M.Ozatkas, N.Erkaya, M.A.Kutay: "Effect of fractional Fourier transformation on time-frequency distributions belonging to the Cohen class", *IEEE Sig.Proc.Let.*, vol.3, No.2, Feb.1996, pp.40-41.
- [352] A.K.Ozdemir, O.Arikan: "A high resolution time frequency representation with significantly reduced cross-terms", *Proc.IEEE ICASSP*, vol.2, pp.693 -696, 2000.
- [353] A.K.Ozdemir, O.Arikan: "Fast computation of the ambiguity function and the Wigner distribution on arbitrary line segments", *IEEE Trans.on Signal Processing*, vol.49, no.2, Feb.2001, pp.381-393.
- [354] C.H.Page: "Instantaneous power spectra", *J.Appl.Phys.*, vol.23,1952, pp.103-106.
- [355] S.Palit: "Signal extraction from multiple noisy sensors", *Signal Processing*, vol.61, no.3, Mar.1997.
- [356] A.Papandreou, G.F.Boudreaux-Bartels: "Generalization of the Choi-Williams distribution and the Butterworth distribution for time-frequency analysis", *IEEE Trans.on Signal Processing*, vol.41, no.1, jan.1993, pp.463-472.
- [357] A.Papandreou-Suppappola, R.L.Murray, Iem Byeong-Gwan, G.F.Boudreaux-Bartels: "Group delay shift covariant quadratic time-frequency representations", *IEEE Trans.on Signal Processing*, vol.49, no.11, Nov.2001, pp.2549-2564.
- [358] A.Papandreou-Suppappola, S.B.Suppappola: "Analysis and classification of time-varying signals with multiple time-frequency structures", *IEEE Sig.Proc.Let.*, vol.9, no.3, March 2002, pp.92-95.
- [359] A.Papoulis, *Signal analysis*, McGraw Hill Book Company, New York, 1977.
- [360] R.K.Pearson: "Scale-invariant nonlinear digital filters", *IEEE Trans.on Signal Processing*, vol.50, no.8, Aug.2002, pp.1986-1993.
- [361] F.Pedersini, A.Sarti, S.Tubaro: "Joint automation design for prefilter and decimation grid for the reduction of spectral redundancy in 2D digital signals", *Signal Processing*, vol.63, no.3, Mar.1998.
- [362] M.Pasquier, P.Gonclaves, R.Baraniuk: "Hybrid linear/bilinear time-scale analysis", *IEEE Trans.on Signal Processing*, vol.47, no.1, Jan.1999, pp.254-260.

- [363] T.T.J.M.Peeters, O.Ciftcioglu: "Statistics on exponential averaging of periodograms", *IEEE Trans.on Signal Processing*, vol.43, no.7, July 1995, pp.1631-1637.
- [364] S.C.Pei, E.J.Tsai: "Cross-terms analysis in the modified instantaneous power spectrum", *IEEE Trans.on Signal Processing*, vol.41, no.1, Jan.1993, pp.477-480.
- [365] S.C.Pei, E.J.Tsai: "New time-frequency distribution", *Circuits, Systems, and Signal Processing*, vol.14, no.4, Apr.1998.
- [366] S.C.Pei, I.I.Yang: "High resolution Wigner distribution using chirp z-transform analysis", *IEEE Trans.on Signal Processing*, vol.39, no.7, July 1991, pp.1699-1702.
- [367] S.C.Pei, I.I.Yang: "Computing pseudo Wigner distribution by the fast Hartley transform", *IEEE Trans.on Signal Processing*, vol.40, no.9, Sep.1992, pp.2346-2349.
- [368] S.C.Pei, M.H.Yeh: "Time frequency split Zak transform for finite Gabor expansion", *Signal Processing*, vol.52, no.3, Mar.1996.
- [369] S.C. Pei: "Two-dimensional affine generalized fractional Fourier transform", *IEEE Trans.on Signal Processing*, vol.49, no.4, April 2001, pp.878-897.
- [370] S.C. Pei, Jian-Jiun Ding: "Relations between fractional operations and time-frequency distributions, and their applications", *IEEE Trans.on Signal Processing*, vol.49, no.8, Aug.2001, pp.1638-1655.
- [371] S.Peleg, B.Friedlander: "The discrete polynomial-phase transform", *IEEE Trans.on Signal Processing*, vol.43, no.8, Aug.1995, pp.1901-1915.
- [372] S.Peleg, B.Porat: "Estimation and classification of polynomial phase signals", *IEEE Trans.on Information Theory*, no.3, Mar.1991, pp.422-430.
- [373] S.Peleg, B.Porat, B.Friedlander: "The achievable accuracy in estimating the instantaneous phase and frequency of a constant amplitude signal", *IEEE Trans.Sig.Processing*, Vol.41, pp.2216-2223, June 1993.
- [374] P.Pesola, H.Olkkonen: "Autoregressive state-space approach for numerical signal processing", *Signal Processing*, vol.63, no.3, Mar.1998.
- [375] D.Petranović, S.Stanković, L.J.Stanković: "Special purpose hardware for time-frequency analysis", *Electronics Letters*, vol.33, no.6, Mar.1997, pp.464-466.
- [376] F.Peyrin, R.Prost: "A unified definition for the discrete-time, discrete frequency, and discrete time/frequency Wigner distributions", *IEEE Trans.Acoust.Speech, Signal Processing*, vol.34, no.4, Aug.1986, pp.858-867.
- [377] W.J.Pielemeir, G.H.Wakefield, M.H.Simoni: "Time-frequency analysis of musical signals", *Proc.IEEE*, vol.84, no.9, Sept, pp.1216-1230.
- [378] J.W.Pitton, L.E.Atlas: "Discrete-time implementation of the cone-kernel time-frequency representation", *IEEE Trans.on Signal Processing*, vol.43, no.8, Aug.1995, pp.1996-1998.
- [379] J.W.Pitton, K.Wang, B.H.Juang: "Time-frequency analysis of auditory modeling for automatic recognition of speech", *Proc.IEEE*, vol.84, no.9, Sept, pp.1199-1215.
- [380] A.Piva, M.Barni, F.Bartolini, V.Cappellini: "DCT-based watermark recovering without restoring to the uncorrupted original image", *Proceedings of ICIP'97*, Santa Barbara, CA, USA, October 26-29, 1997, Vol.I, pp.52-523.
- [381] B.Porat: "Digital processing of random signals", Prentice Hall, 1994.
- [382] B.Porat, B.Friedlander: "Asymptotic analysis of the high-order ambiguity function for parameter estimation of the polynomial-phase signal", *IEEE Trans.on Inform.theory*, vol.42, pp.995-1001, May 1996.
- [383] W.A.Porter: "Computational aspects of quadratic signal processing", *IEEE Trans.Acoust.Speech, Signal Processing*, vol.38, no.1, Jan.1990, pp.137-144.
- [384] K.M.M.Prabhu, R.S.Sundaram: "Fixed-point error analysis of discrete Wigner-Ville distribution", *IEEE Trans.on Signal Processing*, vol.45, no.10, Oct.1997, pp.2579-2582.
- [385] L.Qui, H.Yang, S.N.Koh: "Fundamental frequency determination based on wavelet transform and instantaneous frequency estimation", *Signal Processing*, vol.44, no.2, Feb.1995.
- [386] S.Qui: "The undersampled discrete Gabor transform", *IEEE Trans.on Signal Processing*, vol.46, no.5, May 1998, pp.1221-1229.
- [387] S.Qui, H.G.Feichtinger: "Discrete Gabor structures and optimal representations", *IEEE Trans.on Signal Processing*, vol.43, no.10, Oct.1995, pp.2258-2269.

- [388] S.Qian, D.Chen: "Joint Time-Frequency Analysis", Englewood Cliffs, NJ, Prentice Hall,1996.
- [389] B.G.Quinn, I.V.L.Clarkson, P.J.Kootsookos: "Comments on "On the performance of the weighted linear predictor frequency estimator"", *IEEE Trans.on Signal Processing*, vol.46, no.2, Feb.1998, pp.526-527.
- [390] *Proceedings of the IEEE*, special issue on Time-Frequency Analysis, vol.84, no.9, Sep.1996.
- [391] W.A.Rabadi, H.R.Myler: "Iterative image reconstruction: a wavelet approach", *IEEE Sig.Proc.Let.*, vol.5, No.1, Jan.1998, pp.1-3.
- [392] P.Rao, F.J.Taylor: "Estimation of IF using the discrete Wigner-Ville distribution", *Electronic Letters*, vol.26, pp.246-248, 1990.
- [393] L.Rebollo-Neira, A.G.Constantinides: "Power spectrum estimation from noisy autocorrelations values", *Signal Processing*, vol.50, no.3, Mar.1996.
- [394] L.Rebollo-Neira, J.Fernandez-Rubio: "On wideband deconvolution using wavelet transform", *IEEE Sig.Proc.Let.*, vol.4, No.7, Jul.1997, pp.207-209.
- [395] T.Reed, H.Wechsler: "Segmentation of textured images and Gestalt organization using spatial/spatial-frequency representations", *IEEE Trans.Pattern Analysis, Mach.Intell.*, vol.12, no.1, 1990, pp.1-12.
- [396] D.C.Reid, A.M.Zoubir, B.Boashash: "Aircraft flight parameter estimation based on passive acoustic techniques using the polynomial Wigner-Ville distribution, *J.Acoust.Soc.Am.*, vol.102, no.1, pp.207-223, 1997.
- [397] C.Richard: "Linear redundancy of information carried by the discrete Wigner distribution", *IEEE Trans.on Signal Processing*, vol.49, no.11, Nov.2001, pp.2536-2544.
- [398] C.Richard: "Time-frequency-based detection using discrete-time discrete-frequency Wigner distributions", *IEEE Trans.on Signal Processing*, vol.50, no.9, Sept.2002, pp.2170-2176.
- [399] C.Richard, R.Lengelle: "On the linear relations connecting the components of the discrete Wigner distribution in the case of real-valued signals", *Proc.IEEE ICASSP*, vol.1, pp.85-88 vol.1, 2000.
- [400] M.S.Richman, T.W.Parks, R.G.Shenoy: "Discrete-time, discrete-frequency, time-frequency analysis", *IEEE Trans.on Signal Processing*, vol.46, no.6, June 1998, pp.1517-1528.
- [401] A.W.Rihaczek: "Signal energy distribution in time and frequency", *IEEE Trans.on Information Theory*, vol.14, 1968, pp.369-374.
- [402] B.Ristic, B.Boashash: "Kernel design for time-frequency signal analysis using the Radon transform", *IEEE Trans.on Signal Processing*, vol.41, no.5, May 1993, pp.1996-2008.
- [403] B.Ristic, B.Boashash: "Relationship between the Polynomial and Higher order Wigner-Ville distribution", *IEEE Signal Processing Letters*, vol.2, no.12, Dec.1995, pp.227-229.
- [404] B.Ristic, B.Boashash: "Instantaneous frequency estimation of quadratic and cubic FM signals using the cross polynomial Wigner-Ville distribution", *IEEE Trans.on Signal Processing*, vol.44, no.6, June 1996, pp.1549-1553.
- [405] O.Rioul, P.Flandrin: "Time-scale energy distributions: A general class extending wavelet transforms", *IEEE Trans.on Signal Processing*, no.7, July 1992, pp.1746-1757.
- [406] O.Rioul, M.Vetterli: "Wavelets and signal processing", *IEEE Signal Processing Magazine*, Oct.1991, pp.14-38.
- [407] S.Rogues, K.Bouyoucef, L.Touzillier, J.Vigneau: "Prior knowledge and multiscaling in statistical estimation of signal-to-noise ratio", *Signal Processing*, vol.41, no.3, Mar.1996.
- [408] M.D.Sacchi, T.J.Urlych, C.J.Walker: "Interpolation and extrapolation using a high-resolution discrete Fourier transform", *IEEE Trans.on Signal Processing*, vol.46, no.1, Jan.1998, pp.310-39.
- [409] B.Samimy, G.Rizzoni: "mechanical signature analysis using time-frequency signal processing: application to internal combustion engine knock detection", *Proc.IEEE*, vol.84, no.9, Sept.1996, pp.1330-1343.
- [410] B.Santhanam, J.H.McClellan: "The discrete rotational Fourier transform", *IEEE Trans.on Signal Processing*, vol.44, no.4, Apr.1996, pp.994-998.
- [411] A.M.Sayeed: "On the equivalence of the operator and kernel methods for joint distributions of arbitrary variables", *IEEE Trans.on Signal Processing*, vol.45, no.4, Apr.1997, pp.1067-1070.
- [412] A.M.Sayeed, D.L.Jones: "Optimal detection using bilinear time-frequency and time-scale representations", *IEEE Trans.on Signal Processing*, vol.43, no.12, Dec.1995, pp.2872-2884.

- [413] A.M.Sayeed, D.L.Jones: "Integral transforms covariant to unitary operators and their implications for joint signal representations", *IEEE Trans.on Signal Processing*, vol.44, no.6, June 1996, pp.1365-1378.
- [414] A.M.Sayeed, D.L.Jones: "Equivalence of generalized joint signal representations of arbitrary variables", *IEEE Trans.on Signal Processing*, vol.44, no.12, Dec.1996, pp.2959-2971.
- [415] A.M.Sayeed, D.L.Jones: "Corrections to "Optimal detection using bilinear time-frequency and time-scale representations"", *IEEE Trans.on Signal Processing*, vol.45, no.3, Mar.1997, pp.761-763.
- [416] A.M.Sayeed, D.L.Jones: "A canonical covariance-based method for generalized joint signal representation", *IEEE Sig.Proc.Let.*, vol.3, No.4, Apr.1996, pp.121-123.
- [417] A.Scaglione, S.Barbarossa: "On the spectral properties of polynomial-phase signals", *IEEE Sig.Proc.Let.*, vol.5, No.9, Sep.1998, pp.237-240.
- [418] L.L.Scharf, B.Friedlander: "Toeplitz and Hankel kernels for estimating time-varying spectra of discrete-time random processes", *IEEE Trans.on Signal Processing*, vol.49, no.1, Jan.2001, pp.179-189.
- [419] R.A.Scheper, A.Teolis: "Cramer-Rao bounds for wavelet transform-based instantaneous frequency estimates", *IEEE Trans.on Signal Processing*, vol.51, no.6, June 2003, pp.1593-1603.
- [420] B.Scholkopf, K.-K.Sung, C.J.C.Burges, F.Girosi, P.Niyogi, T.Poggio, V.Vapnik: "Comparing support vector machines with Gaussian kernels to radial basis function classifiers", *IEEE Trans.on Signal Processing*, vol.45, no.11, Nov.1997, pp.2758-2766.
- [421] S.I.Shah, P.J.Loughlin, L.F.Chaparro, A.El-Jaroudi: "Informative priors for minimum cross-entropy positive time-frequency distributions", *IEEE Sig.Proc.Let.*, vol.4, No.6, Jun.1997, pp.176-177.
- [422] C.Shen, U.Lemmin: "Ultrasonic intensity power spectrum estimation by using bispectral reconstruction technique", *Signal Processing*, vol.61, no.1, Jan.1997.
- [423] R.G.Shenoy, T.W.Parks: "The Weyl correspondence and time-frequency analysis", *IEEE Trans.on Signal Processing*, vol.42, no.2, Feb.1994, pp.318-331.
- [424] R.G.Shenoy, T.W.Parks: "Wide-band ambiguity functions and affine Wigner distributions", *Signal Processing*, vol.41, no.3, Mar.1996.
- [425] O.V.Shentov, S.K.Mitra, U.Heute, A.N.Hossen: "Subband DFT - part I: Definition, interpretation, and implementation", *Signal Processing*, vol.41, no.3, Mar.1996.
- [426] D.C.Shin, C.L.Nikias: "Complex ambiguity functions using nonstationary higher order cumulant estimates", *IEEE Trans.on Signal Processing*, vol.43, no.10, Oct.1995, pp.2649-2665.
- [427] S.Shinde, V.M.Gadre: "An uncertainty principle for real signals in the fractional Fourier transform domain", *IEEE Trans.on Signal Processing*, vol.49, no.11, Nov.2001, pp.2545-2548.
- [428] V.Shtrauss: "Spectrum analysis and synthesis of relaxation signals", *Signal Processing*, vol.63, no.2, Feb.1998.
- [429] L.H.Sibul, L.G.Weiss, R.K.Young: "Weighted time-frequency and time-scale transforms in reproducing kernel Hilbert spaces", *IEEE Sig.Proc.Let.*, vol.4, No.1, Jan.1997, pp.21-22.
- [430] L.Sk: "Application of the L-Wigner distribution to the diagnosis of local defects of gear tooth", *KSME International Journal*, vol.13, no.2, Feb.1999, pp.144-157.
- [431] M.D.Srinath, P.K.Rajasekaran, Viswanathan, *Statistical signal processing and applications*, Prentice Hall, 1996.
- [432] L.J.Stanković: "A method for time-frequency analysis", *IEEE Trans.on Signal Processing*, vol.42, no.1, Jan.1994, pp.225-229.
- [433] L.J.Stanković: "An analysis of Wigner higher order spectra of multicomponent signals", *Annales des telecommunications*, no.3/4, Mar./Apr., 1994, pp.132-136.
- [434] L.J.Stanković: "A multitime definition of the Wigner higher order distribution: L-Wigner distribution", *IEEE Signal Processing Letters*, vol.1, no.7, July 1994, pp.106-109.
- [435] L.J.Stanković: "An analysis of some time-frequency and time-scale distributions", *Annales des Telecommunications*, vol.49, no.9/10, Sep./Oct.1994, pp.505-517.
- [436] L.J.Stanković: "A method for improved distribution concentration in the time-frequency analysis of the multicomponent signals using the L-Wigner distribution", *IEEE Trans.on Signal Processing*, vol.43, no.5, May 1995, pp.1262-1268.

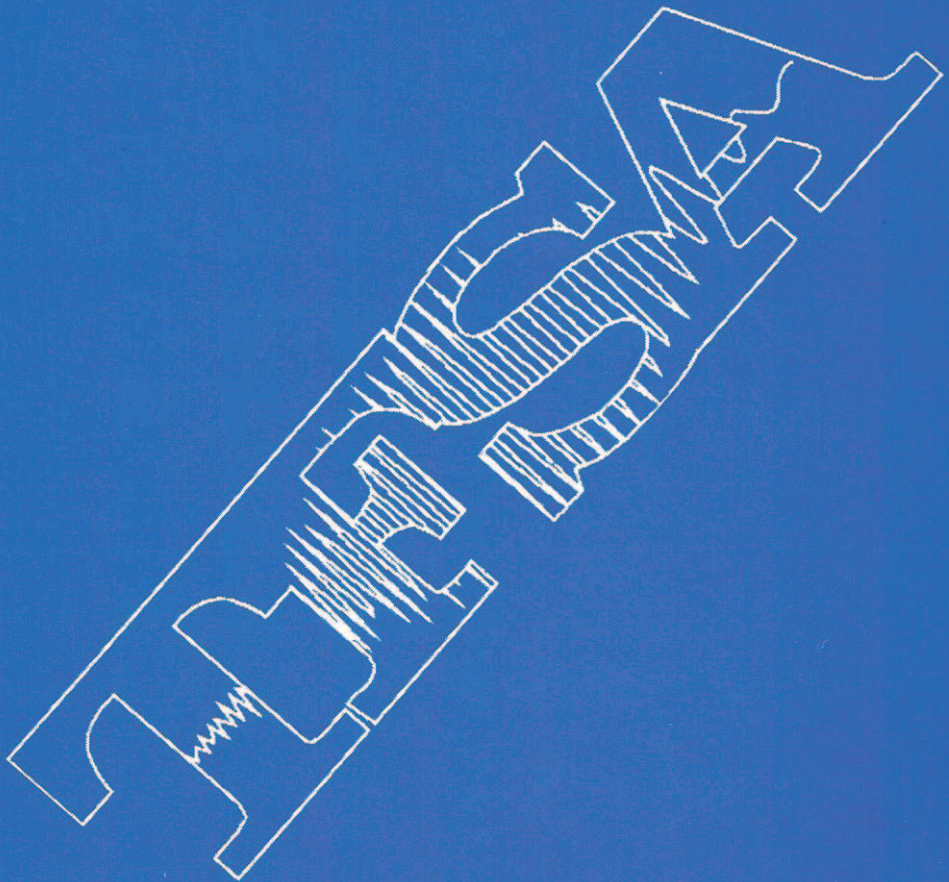
- [437] L.J.Stanković: "L-class of time-frequency distributions", *IEEE Signal Processing Letters*, vol.3, no.1, Jan.1996, pp.22-25.
- [438] L.J.Stanković: "A time-frequency distribution concentrated along the instantaneous frequency", *IEEE Signal Processing Letters*, vol.3, no.3, Mar.1996, pp.89-91.
- [439] L.J.Stanković: "The auto-term representation by the reduced interference distributions; The procedure for a kernel design", *IEEE Trans.on Signal Processing*, vol.44, no.6, June 1996, pp.1557-1564.
- [440] L.J.Stanković: "Highly concentrated time-frequency distributions: Pseudo quantum signal representation", *IEEE Trans.on Signal Processing*, vol.45, no.3, Mar.1997, pp.543-552.
- [441] L.J.Stanković: "S class of distributions", *IEE Proc.Vision, Image and Signal Processing*, vol., no.2, April 1997, pp.57-64.
- [442] L.J.Stanković: "Local polynomial Wigner distribution", *Signal Processing*, vol.59, no.1, May 1997, pp.123-128.
- [443] L.J.Stanković: "Algorithm for the Wigner distribution of noisy signals realization", *Electronic Letters*, vol.34, no.7, April 1998, pp.622-624.
- [444] L.J.Stanković: "On the realization of the polynomial Wigner-Ville distribution for multicomponent signals", *IEEE Sig.Proc.Letters*, vol.5, no.7, July 1998, pp.157-159.
- [445] L.J.Stanković, I.Djurović: "Relationship between ambiguity function coordinate transformations and fractional Fourier transform", *Annales des Telecommunications*, vol.53, no.7/8, July-Aug.1998, pp.316-319.
- [446] L.J.Stanković, V.Ivanović: "Further results on the minimum variance time-frequency distribution kernels", *IEEE Trans.on Signal Processing*, vol.45, no.6, June 1997, pp.1650-1655.
- [447] L.J.Stanković, V.Ivanović, Z.Petrović: "Unified approach to the noise analysis in the Wigner distribution and Spectrogram using the S-method", *Annales des Telecommunication*, no.11/12, Nov./Dec.1996, pp.585-594.
- [448] L.J.Stanković, V.Katkovnik: "Algorithm for the instantaneous frequency estimation using time-frequency distributions with variable window width", *IEEE Sign.Proc.Letters*, vol.5, No.9, Sept.1998, pp.224-227.
- [449] L.J.Stanković, S.Stanković: "Wigner distribution of noisy signals", *IEEE Trans.on Signal Processing*, vol.41, no.2, Feb.1993, pp.956-960.
- [450] L.J.Stanković, S.Stanković: "On the Wigner distribution of the discrete-time noisy signals with application to the study of quantization effects", *IEEE Trans.on Signal Processing*, vol.42, no.7, July 1994, pp.1863-1867.
- [451] L.J.Stanković, S.Stanković: "An analysis of the instantaneous frequency representation by some time-frequency distributions -Generalized Wigner distribution", *IEEE Trans.on Signal Processing*, vol.43, no.2, Feb.1995, pp.549-552.
- [452] L.J.Stanković, V.Katkovnik: "The Wigner distribution of noisy signals with adaptive time-frequency varying window" *IEEE Trans.on Signal Processing*, vol-47, no.4, April 1999, pp.1099-1108.
- [453] L.J.Stanković, J.F.Böhme:"Time-frequency analysis of multiple resonances in combustion engine signals", *Signal Processing*, vol.79, no.1, Nov.1999, pp.15-28.
- [454] L.J.Stanković, S.Stanković, Z.Uskoković, *Time-frequency signal analysis, research monograph*, Epsilon-Montenegropublic, 1994.
- [455] L.J.Stanković: "Time-frequency distributions with complex argument", *IEEE Trans.on Signal Processing*, vol.50, no.3, March 2002, pp.475-486.
- [456] L.J.Stanković, I.Djurović: "A note on "An overview of aliasing errors in discrete-time formulations of time-frequency representations" ", *IEEE Trans.on Signal Processing*, vol.49, no.1, Jan.2001, pp.257-259.
- [457] L.J.Stanković, I.Djurović, S.Stanković: "The robust Wigner distribution", *Proc.IEEE ICASSP*, vol.1, pp.77 -80, vol.1, 2000.
- [458] L.J.Stanković, V.Katkovnik: "Instantaneous frequency estimation using higher order L-Wigner distributions with data-driven order and window length", *IEEE Trans.on Information Theory*, vol.46, no.1 , Jan.2000, pp.302-311.

- [459] L.J.Stanković: "Analysis of noise in time-frequency distributions", *IEEE Sig.Proc.Let.*, vol.9, no.9, Sept.2002, pp.286-289.
- [460] L.J.Stanković: "Quadratic and higher order time-frequency analysis based on the short-time Fourier transform", in *6th Int.Symp.on Signal Processing and its Applications*, vol.2, Aug.2001, pp.581-582.
- [461] L.J.Stanković, T.Alieva, M.J.Bastiaans: "Fractional-Fourier-domain weighted Wigner distribution", in *Proc.11th IEEE Signal Processing Workshop on Statistical Signal Processing*, Aug.2001, pp.321-324.
- [462] L.J.Stanković, M.J.Bastiaans: "Noise analysis in Toeplitz and Hankel kernels for estimating time-varying spectra", in *6th Int.Symp.on Signal Processing and its Applications*, vol.1, Aug.2001, pp.335-338.
- [463] L.J.Stanković, M.Daković, Ivanović, V: "Performance of spectrogram as IF estimator", *Electronics Letters*, vol.37, no.12, Jun 2001, pp.797-799.
- [464] L.J.Stanković, I.Djurović, A.Ohsumi, H.Ijima: "Instantaneous frequency estimation by using wigner distribution and viterbi algorithm", *Proc.IEEE ICASSP*, vol.6, pp.VI.121-VI.124.
- [465] L.J.Stanković, S.Stanković, I.Djurović: "Space/spatial-frequency analysis based filtering", *IEEE Trans.on Signal Processing*, vol.48, no.8, Aug.2000, pp.2343-2352.
- [466] S.Stanković, I.Djurović, V.Vukovic: "System architecture for space-frequency image analysis", *Electronics Letters*, vol.34,no.23, Nov.1998, pp.2224-2225.
- [467] S.Stanković, I.Djurović, I.Pitas: "Watermarking in the space/spatial-frequency domain using two-dimensional Radon-Wigner distribution", *IEEE Trans on Image Processing*, vol.10, no.4, April 2001, pp.650-658.
- [468] S.Stanković, L.J.Stanković: "An architecture for the realization of a system for time-frequency signal analysis", *IEEE Trans.on Circuits and Systems II*, vol.44, no.2, Feb.1997, pp.600-604.
- [469] S.Stanković, L.J.Stanković: "Introducing time-frequency distributions with a "complex-time" argument", *Electronics Letters*, vol.32, no.14, July 1996, pp.1265-1267.
- [470] S.Stanković, L.J.Stanković, Z.Uskoković: "On the local frequency, group shift and cross-terms in some multidimensional time-frequency distributions; A method for multidimensional time-frequency analysis", *IEEE Trans.on Signal Processing*, vol.43, no.7, July 1995, pp.1719-1725.
- [471] S.Stanković, L.J.Stanković, Z.Uskoković: "Modified Wigner bispectrum and its generalizations", *Circuits, Systems and Signal Processing*, vol.16, no.1, Jan.1997, pp.27-40.
- [472] S.Stanković, J.Tilp: "Time-varying filtering of speech signals using linear prediction", *Electronics Letters*, vol.36, no.8, April 2000, pp.763-764.
- [473] E.V.Stansfield: "Accuracy of an interferometer in noise", *IEE Proceedings: Radar, Sonar and Navigation*, vol.143, no.4, Mar.1997.
- [474] P.Stoica, T.Soderstrom: "On the convergence properties of a time-varying recursion", *IEEE Sig.Proc.Let.*, vol.2, No.5, May 1995, pp.95-96.
- [475] M.Sun, C.C.Li, L.N.Sekhar, R.J.Sclabassi: "Efficient computation of the discrete pseudo Wigner distribution", *IEEE Trans.Acoust., Speech, Signal Processing*, vol.37, no.11, Nov.1989, pp.1735-1741.
- [476] M.Sun, S.Qian, X.Yan, S.B.Baumann, X.G.Xia, R.E.Dahl, N.D.Ryan, R.J.Sclabassi: "Localizing functional activity in the brain through time-frequency analysis and synthesis of the EEG", *Proc.IEEE*, vol.84, no.9, Sept.1996, pp.1302-1311.
- [477] M. Sun, R.J.Sclabassi: "Enhancing weak signal components in time-frequency distributions by wavelet pre-processing", *Proc.IEEE ICASSP*, vol.2, pp.673 -676, 2000.
- [478] H.Suzuki, F.Kobayashi: "A method of two-dimensional spectral analysis using the Wigner distribution", *Electronics and Communications in Japan*, vol.75, no.1, 1992, pp.1006-1013.
- [479] M.T.Swanson, B.Zhu, A.H.Tewfik, L.Boney: "Robust audio watermarking using perceptual masking", *Signal Processing*, vol.66, no.3, 1998 pp.337-355.
- [480] B.Tacer, P.Loughlin: "Positive time-scale distributions", in *Proc.of the IEEE-SP on TFTS Analysis*, Philadelphia, Oct.1994, pp.201-204.
- [481] B.Tacer, P.Loughlin: "Time-scale energy density functions", *IEEE Trans.on Signal Processing*, vol.44, no.5, May 1996, pp.1310-1314.

- [482] V.I.Tatarski: "Wigner representations in quantum mechanics", in russian, *Uspehi Fiziceskih Naum*, vol.139, no.4, April 1993, pp.587-619.
- [483] G.Thomas, S.D.Cabrera: "Resolution enhancement in time-frequency distributions based on adaptive time extrapolations", in *Proc.of the IEEE-SP on TFTS Analysis*, Philadelphia, Oct.1994, pp.104-107.
- [484] T. Le, M.Glesner: "Computing discrete time-frequency distributions using principal component filter bank", *Proc.IEEE ICASSP*, vol.1, pp.528-531 vol.1, 2000.
- [485] A.Z.Tirkel, C.F.Osborne, T.E.Hall, Image and watermark registration, *Signal Processing*, vol 66, no.3, 1998, pp.373-383.
- [486] S.Tomazić: "On short time Fourier transform with single-sided exponential window", *Signal Processing*, vol.55, no.2, Feb.1997.
- [487] M.Unser: "Fast Gabor-like windowed Fourier and continuous Wavelet trabsform", *IEEE Sig.Proc.Let.*, vol.1, No.5, May 1994, pp.76-79.
- [488] M.Unser, P.Thevenaz, A.Aldroubi: "Shift orthogonal wavelet bases using splines", *IEEE Sig.Proc.Let.*, vol.3, No.3, Mar.1996, pp.85-88.
- [489] H.Ur, D.Gold: "Reduction of quantization noise in the notch Fourier transform", *Signal Processing*, vol.64, no.2, Feb.1997.
- [490] H.L.Van Trees, *Detection, Estimation, and Modulation Theory*, New York: Wiley, 1968.
- [491] S.V.Vaseghi, *Advanced Signal Processing and digital noise reduction*, Wiley, 1996.
- [492] G.T.Venkatesan, M.G.Amin: "Time-frequency distribution kernels using FIR filter design techniques", *IEEE Trans.on Signal Processing*, vol.45, no.6, June 1997, pp.1645-1650.
- [493] G.T.Venkatesan, M.G.Amin: "Time-frequency distribution kernel design over a discrete powers-of-two space", *IEEE Sig.Proc.Let.*, vol.3, No.12, Dec.1996, pp.305-306.
- [494] M.Vetterli, J.Kovačević, *Wavelets and subband coding*, Prentice Hall, 1994.
- [495] J.Ville: "Theorie et applications de la notion de signal analytique", *Cables es Transmission*, vol.2, no.1, 1946, pp.61-74.
- [496] M.J.Vrhel, C.Lee, M.Unser: "Fast continuous wavelet transform: A least squares formulation", *Signal Processing*, vol.57, no.2, Feb.1997.
- [497] G.Voyatzis, N.Nikolaidis, I.Pitas: "Digital watermarking: An overview", *EURASIP Conf.*, Rhode, Greece, Sept.1998, Vol.1, pp.9-12.
- [498] C.Wang, M.G.Amin: "Performance analysis of instantaneous frequency-based interference excision techniques in spread spectrum communications", *IEEE Trans.on Signal Processing*, vol.46, no.1, Jan.1998, pp.70-83.
- [499] M.Wang, A.K.Chan, C.K.Chui: "Linear frequency-modulated signal detection using Radon-ambiguity transform", *IEEE Trans.on Signal Processing*, vol.46, no.3, Mar.1998, pp.571-587.
- [500] D.Weil, A.C.Bovik: "On the instantaneous frequencies of multicomponent AM-FM signals", *IEEE Sig.Proc.Let.*, vol.5, No.4, Apr.1998, pp.84-86.
- [501] D.Weil, B.L.Evans, A.C.Bovik: "Loss of perfect reconstruction in multidimensional filterbanks designed via extended McClellan transformations", *IEEE Sig.Proc.Let.*, vol.4, No.10, Oct.1997, pp.295-297.
- [502] W. Wang, D.H.Johnson: "Computing linear transforms of symbolic signals", *IEEE Trans.on Signal Processing*, vol.50, no.3, March 2002, pp.628-634.
- [503] P.E.Wigner: "On the quantum correction for thermodynamic equilibrium", *Phys.Rev.*, 1932, vol.40, pp.246-254.
- [504] P.R.White, D.M.Lopes: "Time-frequency methods for analyzing structural response data", *Proc.IEEE ICASSP*, vol.6, pp.3878 -3881, 2000.
- [505] W.J.Williams: "Reduced interference distributions: Biological applications and interpretations", *Proc.IEEE*, vol.84, no.9, Sept.1996, pp.1264-1280.
- [506] J.M.Winograd: "Incremental refinement structures for approximate Signal Processing", *Ph.D.Dissertation,Boston University*, Feb.1997.
- [507] J.M.Winograd, S.H.Nawab: "Incremental refinement of DFT and STFT approximations", *IEEE Sig.Proc.Let.*, vol.2, No.2, Feb.1995, pp.25-27.
- [508] J.C.Wood, D.T.Barry:"Linear signal synthesis using the Radon-Wigner distribution", *IEEE Trans.on Signal Processing*, vol.42, no.8, Aug.1994, pp.2105-2111.

- [509] J.C.Wood, D.T.Barry: "Radon transform of time-frequency distributions for analysis of multi-component signals", *IEEE Trans.on Signal Processing*, vol.42, no.11, Nov.1994, pp.3166-3177.
- [510] J.C.Wood, D.T.Barry: "Time-frequency analysis of skeletal muscle and cardiac vibrations", *Proc.IEEE*, vol.84, no.9, Sept.1996, pp.1281-1294.
- [511] D.Wu, J.M.Morris: "Time-frequency representations using radial Butterworth kernel", in *Proc.of the IEEE-SP on TFTS Analysis*, Philadelphia, Oct.1994, pp.60-63.
- [512] D.Wu, J.M.Morris: "Discrete Cohen's class of distributions", in *Proc.of the IEEE-SP on TFTS Analysis*, Philadelphia, Oct.1994, pp.532-535.
- [513] J.Xi, J.F.Chicharo: "A new structure for the running discrete Hartley transform", *Signal Processing*, vol.54, no.2, Feb.1997.
- [514] X.G.Xia: "On characterization of the optimal biorthogonal window functions for Gabor transforms", *IEEE Trans.on Signal Processing*, vol.44, no.1, Jan.1996, pp.133-136.
- [515] X.G.Xia: "System identification using chirp signals and time-variant filters in the joint time-frequency domain", *IEEE Trans.on Signal Processing*, vol.45, no.8, Aug.1997, pp.2072-2085.
- [516] X.G.Xia: "A quantitative analysis of SNR in the short-time Fourier transform domain for multicomponent signals", *IEEE Trans.on Signal Processing*, vol.46, no.1, Jan.1998, pp.200-203.
- [517] X.G.Xia: "On bandlimited signals with fractional Fourier transform", *IEEE Sig.Proc.Let.*, vol.3, No.3, Mar.1996, pp.72-74.
- [518] X.G.Xia, Y.Owechko, B.H.Soffer, R.M.Matic: "On generalized-marginal time-frequency distributions", *IEEE Trans.on Signal Processing*, vol.44, no.11, Nov.1996, pp.2882-2887.
- [519] X.G.Xia, L.Cohen: "On analytic signals with nonnegative instantaneous frequencies", *Proc.IEEE ICASSP*, pp.1329-1332, 1999.
- [520] A.E.Yagle: "Region-of-interest tomography using the wavelet transform and angular harmonics", *IEEE Sig.Proc.Let.*, vol.1, No.9, Sep.1994, pp.134-135.
- [521] L.A.Zadeh: "Frequency analysis of variable networks", *Proc.IRE*, vol.67, March 1950, pp.291-299.
- [522] E.J.Zalubas, M.G.Amin: "Time-frequency kernel design by the two-dimensional frequency transformation method", *IEEE Trans.on Signal Processing*, vol.43, no.9, Sept.1995, pp.2198-2203.
- [523] C.J.Zarowski: "An approach to initializing the wavelet packet transform", *IEEE Sig.Proc.Let.*, vol.4, No.5, May 1997, pp.132-134.
- [524] P.Zavarsky, N.Fujii: "Introduction of cross ambiguity function for elimination of crossterms in Wigner distribution of the third order", *Electronics Letters*, Vol.32, no.2, pp.94-95, Jan.1996.
- [525] A.I.Zayed: "On the relationship between the Fourier and fractional Fourier transforms", *IEEE Sig.Proc.Let.*, vol.3, No.12, Dec.1996, pp.310-311.
- [526] A.I.Zayed: "A convolution and product theorem for the fractional Fourier transform", *IEEE Sig.Proc.Let.*, vol.5, No.4, Apr.1998, pp.101-103.
- [527] A.I.Zayed: "Hilbert transform associated with the fractional Fourier transform", *IEEE Sig.Proc.Let.*, vol.5, No.8, Jan.1998, pp.206-208.
- [528] Q.T.Zhang: "A statistical resolution theory of the Beamformer-based spatial spectrum for determining the directions of signals in white noise", *IEEE Trans.on Signal Processing*, vol.43, no.8, Aug.1995, pp.1867-1874.
- [529] B.Zhang, S.Sato: "A time-frequency distribution of Cohen's class with a compound kernel and its application to speech signal processing", *IEEE Trans.on Signal Processing*, vol.42, no.1, Jan.1994, pp.54-64.
- [530] Y.Zhang, M.G.Amin: "Spatial averaging of time-frequency distributions", *Proc.IEEE ICASSP*, pp.1337-1340, 1999.
- [531] Y.Zhang, M.G.Amin: "Array processing for nonstationary interference suppression in DS/SS communications using subspace projection techniques", *IEEE Trans.on Signal Processing*, vol.49, no.12, Dec.2001, pp.3005-3014.
- [532] Y.Zhang, M.G.Amin: "Spatial averaging of time-frequency distributions for signal recovery in uniform linear arrays", *IEEE Trans.on Signal Processing*, vol.48, no.10, Oct.2000, pp.2892-2902.
- [533] Y.Zhang, W. Mu, M.G.Amin: "Subspace analysis of spatial time-frequency distribution matrices", *IEEE Trans.on Signal Processing*, vol.49, no.4, April 2001, pp.747-759.
- [534] Y.Zhao: "Spectrum estimation of short-time stationary signals in additive noise and channel distortion", *IEEE Trans. on Signal Processing*, vol. 49, no. 7, July 2001, pp.1409-1420.

- [535] H.Zou, Q.Dai, R.Wang, Y.Li: "Parametric TFR via windowed exponential frequency modulated atoms", *IEEE Sig.Proc.Let.*, vol.8, no.5, May 2001, pp.140-142.
- [536] G.T.Zhou, Y.Wang: "Exploring lag diversity in the higher order ambiguity function for polynomial phase signals", *IEEE Sig.Proc.Let.*, vol.4, No.8, Aug.1997, pp.240-242.
- [537] Y.M.Zhu, R.Goutte, M.Amiel: "On the use of a two-dimensional Wigner -Ville distribution for texture segmentation", *Signal Processing*, vol.30, 1993, pp.329-354.
- [538] Y.M.Zhu, R.Goutte, F.Peyrin: "The use of a two-dimensional Wigner-Ville distribution for texture segmentation", *Signal Processing*, vol.19, no.3, 1990, pp.205-222.
- [539] Y.M.Zhu, F.Peyrin, R.Goutte: "Transformation de Wigner-Ville: description d' un nouvel outil de traitement du signal et des images", *Annales des telecommunication*, vol.42, no.3/4, Mar./Apr.1987, pp.105-117.
- [540] Y.M.Zhu, F.Peyrin, R.Goutte: "Sur la transformation de pseudo Wigner-Ville discrete en temps et en frequence", *Annales des telecommunications*, vol.46, no.5-6, 1991, pp.301-309.
- [541] M.Zibulski, Y.Y.Zeevi: "Discrete multiwindow Gabor-type transforms", *IEEE Trans.on Signal Processing*, vol.45, no.6, June 1997, pp.1428-1443.



www.tfsa.cg.yu