PROCEEDINGS OF INTERNATIONAL CONFERENCE ON

# SIGNAL PROCESSING

Oct. 22 - 26, Beijing, China

Vol. I

Edited by Yuan Baozong



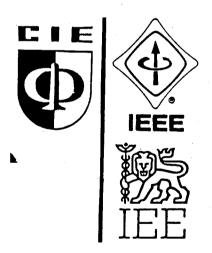
### PROCEEDINGS OF INTERNATIONAL CONFERENCE ON

### SIGNAL PROCESSING

Oct. 22 - 26, Beijing, China

Vol. I

Edited by Yuan Baozong





DISTRIBUTOR OUTSIDE CHINA: International Publishing Company  $G/F^{3}/F$ ., Tung Shing Mansion 950-954, Canton Road, Mongkok, Kowloon, Hong Kong

DISTRIBUTOR IN CHINA:

International Academic Publishers Xizhimenwai Dajie, Beijing Exhibition Centre Beijing 100044, People's Republic of China

Copyright © 1990 by International Academic Publishers
(A Pergamon-CNPIEC Joint Venture)

The book has been photographically reproduced from the best available copy. The papers were not refereed but were reviewed for their technical contents. Editing was restricted to matters of format, general organization and retyping.

The editors assume no responsibility for the accuracy, completeness or usefulness of the information disclosed in this volume. Unauthorized use might infringe on privately owned patents of publication right. Please contact the individual authors for permission to reprint or otherwise use information from their papers.

#### Proceedings of International Conference on Signal Processing

Edited by Yuan Baozong

7-80003-121-7/TN·9

International Academic Publishers

Printed in the People's Republic of China

## INTERNATIONAL CONFERENCE ON SIGNAL PROCESSING

#### SPONSORED BY

Chinese Institute of Electronics (CIE)

#### CO-SPONSORED BY

The Institution of Electrical Engineers (IEE, U.K),

**Electronics Divison** 

Union Radioscientifique Internationale (URSI)

Committee C

**IEEE Beijing Section** 

National Nature Science Foundation of China

CIE Committee for URSI

The Volkswagenwerk Foundation (Federal Republic of Germany)

#### IN-COOPERATED BY

**IEEE ASSP Society** 

#### SUPPORTED BY

Beijing Chapter of Computer Society, IEEE

Beijing Chapter of ASSP Society, IEEE

#### ORGANIZED BY

CIE Signal Processing Society

#### **ICSP'90 Conference Committee**

Conference Chairman:

Luo Peilin, China

Co-chairmen:

T.S. Huang, University of Illinois, U.S.A.
Hiroya Fujisaki, University of Tokyo, Japan
Ke Youan, Beijing Institute of Technology, China
Yuan Baozong, Northern Jiaotong University, China

Advisor:

Chang Tong
Cheng Minde
Cai Changnian

Technical Program Committee

Chairman:

Yuan Baozong, China

Co-chairman:

Hiroya Fujisaki, Japan

Local Organizing Committee

Sha Zong, CIE, China

#### The Technical Program Committee of ICSP'90

#### CHAIRMAN:

Yuan Baozong

Northern Jiaotong Univ., China

CO-CHAIRMAN:

Fujisaki, Hiroya

Dept. of Electronic Eng., University of Tokyo, Japan

MEMBER:

Besslich, PH.W.

Constantinides, A.G. Cheng Qiansheng

Chen Hongbin

Cai Defu Grant, P.M.

Gueguen, Claude

Gulvaev. Yuvi V

Huang, T.S. Haralick, R.M.

Han Yuxian

Huang Shilin

Hou Chaohuan

He Zhenya

Huang Shunji

Kaveh. M. Ke Youan

Kung, H.T. Luder, Ernst

Li Changli Li Qihu Mason, J.S.

Mao Erke Mao Shivi

Moraga, Claudo Neuvo, Y.

Qian Guohui

Qian Yasheng Rao, K.R. Schroeder, M.R.

Siu, Wan-Chi Wang Zhong Wong, K.M. Wu Jingtang

Ying Huaiqiao Zeng Yifang Zhang Yanzhong Zhang Gongli Zhu Weiming

Xu Bingzhen

FB 1, Electrical Eng., University of Bremen, F.R.G. Dept. of E.E., Imperial College, London, U.K.

Dept. of Mathematics, Peking Univ., China

Dept. of Electronic Eng., Shanghai Jiaotong Univ., China

Institute of Electronics, Academia Sinica, China Dept. of Electrical Eng., Univ. of Edinburgh, U.K.

Ecole Nationale Superieure, des Telecommunications, France

Institute of Radio Eng. & Electronics, USSR Academy of Sciences, USSR

Dept. of E.E., University of Illinois, U.S.A. Dept. of E.E., University of Washington, U.S.A.

Beijing Institute of Automation, China Dept. of Automotive Eng., China

Institute of Acoustics, Academia Sinica, China

Southeast Univ., China

Univ. of Electronic Science and Technology of China, China Dept. of E.E., Univ. of Minnesota, Minneapolis MN 55455, U.S.A.

Beijing Univ. of Technology, China

Dept. of Computer Science, Carnegie Mellon University, U.S.A. Institute of Network & System Theory, Univ. of Stuttgart, F.R.G.

Institute of Acoustics, Academia Sinica, China Institute of Electronics, Academia Sinica, China Dept. of EEE, Univ. of Wales (Swansea), U.K.

Beijing Univ. of Technology, China

Beijing Univ. of Aeronautics & Astronautics, China Dept. of Computer Science, Univ. of Dortmund, F.R.G.

Tampere University of Technology, Finland

Harbin Univ. of Technology, China

Dept. of Electronic Eng., Tsinghua Univ., China Dept. of E.E., University of Texas, U.S.A.

Drittes Physikalisches Institut, Univ. Gottingen, F.R.G. Dept. of Electronic Eng., Hong Kong Polytechnic, Hong Kong

Beijing Univ. of Technology, China Dept. of Electrical & Computer Eng., McMaster Univ., Canada

Northern Jiaotong Univ., China South China Univ. of Technology, China

Academy of Railway Sciences, China Beijing Institute of Information Technologies, China

Ministry of Aeronautics and Astronautics, China Dept. of E.E., Hangzhou Institute of Elec. Eng., China Beijing Univ. of Posts and Telecommunications, China

Zou Lihe Dept. of Information and Control, Xian Jiaotong Univ., China

#### CHAIRMAN'S MESSAGE

On behalf of the Conference Committee, I welcome you to attend the 1990 International Conference on Signal Processing, the first ICSP held in China. The conference site is located in Xiang Shan (Fragrant Hill), a beautiful scenic spot in the western suburb of Beijing. I sincerely hope you will enjoy both the attractive scenery and the tranquil environment of the Fragrant Hill, and of course the principle event, the conference. The response to our Call for Paper has exceeded



our expectation. In spite of our best effort to accommodate all papers, it has been necessary for us to turn down about one third of the submissions. To accommodate the large number of high quality papers, in addition to regular presentation sessions, we have organized a number of poster sessions. The papers were selected by our Technical Program Committee, it has worked very diligently to put together an outstanding technical program. In addition to our regular program, we have also organized a workshop and a technical tour. An industrial Exhibition will be held after the conference. I expect earnestly that the conference will be both a major academic event and as well a splendid meeting of international friendship.

Luo Peilin

Conference Chairman



T.S. Huang



Ke Yuoan



Yuan Baozong

## ICSP'90 TECHNICAL PROGRAM COMMITTEE CHAIRMAN'S MASSAGE

It is a pleasure for me to welcome you all to the city of Beijing to attend the International Conference on Signal Processing, ICSP'90. I would like to extend my sincere thanks to all the participants who take special interest in contributing their own experiences on digital signal processing to this conference.

Digital Signal Processing is one of the leading technologies in modern information sciences. It explains why the response of the signal processing community to the call for papers of ICSP'90/Beijing was so overwhelming. We received altogether 514 submissions of abstracts from 24 nations, which is substantially more than that we expected. We are most grateful to all the contributors; without their interest and effort we would not have been able to achieve the high quality reflected in the Technical Program of Conference. Through the technical review procedure, taken by a review committee of 55 prominent experts, 40 of them are the members of the Technical Program Committee, We accepted 355 papers, 110 of which will be presented in poster sessions. Here I am deeply indebted to each member of the Technical Reviews Committee for finishing the fine job in the short duration of three days hardworking.

Within our conference, we have two sessions for the 1990 International Workshop on Spectral Techniques.

The papers are categorized into 12 areas: These areas are: Digital Signal Processing (DSP), Spectrum Estimation and Modeling, Speech Coding and Analysis, Speech Synthesis and Recognition, Multidimensional Signal Processing, VLSI for Signal Processing, Acoustic and Radar Signal Processing, Pattern Recognition, Adaptive Filters, Artificial Intelligence (including Neural Network Implementations) and Applications, Image Processing, Array Signal Processing. All papers to be represented at the conference have been included in the Proceedings of ICSP'90.

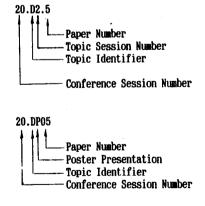
Finally, on the behalf of the Technical Program Committee I would like to express thanks to the Institute of Information Science, Northern Jiaotong University, who provided the computer support to catalogue and access all the abstract submissions. In particular we acknowledge the secratarial assistance of Mrs. Xiao Li and Tang Xiaofang, who processed the conference database and kept close contact with all contributors.

Best wishes to all attendees of ICSP'90, and hope you have a nice time in Beijing.

Yuan Baozong Technical Program Chairman

#### ICSP' 90 TECHNICAL PROGRAM SCHEDULE

							Poster 1	Poster 2
	(	Hall 1	Hall 2	Hall 3	Hall 4	Hall 5	Hall 6	Hall 7
┒		1.41	2.B1	3.C1	4.S1	5.I1	6.Ap	7.Cp.Dp.Hp
M	Morning	Digital	Spectrum	Speech	Spectral	Adaptive	Ap01-10	Cp01-03
o k	9:30 a.m	Signal	Estimation	Coding &	Techniques	Filtering		Dp01-02
		Processing	Modeling	Analysis		1		Hp01-03
D								
A		8.A2	9.F1	10.D1	11.S2	12.K1	13.Ap	14.Kp
Y	Afternoon	Digital	VLSI for	Speech	Spectral	Image	Ap11-19	Kp01-10
ı	1:45 p.m		Signal	Synthesis	Techniques	Processing		<b> </b>
	5:00 p.∎.	Processing		Recogni-				
				tion		10.70	00.0	
		15.A3	16.B2	17.C2	18.H1	19.I2	20.Bp	21.Kp
Ť	Morning	Digital	Spectrum	Speech	Pattern	Adaptive	Bp01-11	Kp11-21
	B:30 a.m		<b>Estimation</b>		Recognition	Filtering		ļ
	12:00 a.m.		& Modeling			00 80	07 D 0	00 1 - 0-
S		22.E1	23.G1	24.D2	25.L1	26.K2	27.Bp.Sp	28. Lp. Ep
D	Afternoon		Acoustic	Speech	Array	Image	Bp12-21	Lp01-07
	1:30 p.m			Synthesis	Processing	Processing	Sp01-02	Ep01-02
Y	5:00 p.m.	Signal		Recogni-	1			
_			Processins		00.80	00.70	04 7	OF To Do
		29.A4	30.B3	31.J1	32.K3	33.13	34.Jp	35. Ip. Pp
E	Morning	Digital	- L	Artificial	Image	Adaptive Filtering	Jp01-10	Ip01-06   Fp01-02
	B:30 a.m		Estimation		Processing	Liicelina		Lb01-05
	12:UU a.m.	Processing	& Modeling					
E		36.SS1	37.C3	Applications 38.J2	39.L2	40.K4	41.Gp	42.SS2
D	Afternoon		Speech	Artificial	Array	Image	Gp01-07	Special
_				Intelli-	Processing	Processing		Subject 2
	1:30 p.m 5:00 p.m.	թատյենել		pence &	11000001119	LIOCCOSINS		
I	p:00 p.∎.		WIGIT212	Applications				



- Digital Signal Processing
- Spectrum Estimation and Modeling

- Speech Coding and Analysis
  Speech Synthesis and Recognition
  Multidimensional Signal Processing
  VLSI for Signal Processing
- Acoustic and Radar Signal Processing
- Pattern Recognition
- Adaptive Filtering
- Artificial Intelligence and Applications
- Image Processing
- Array Processing
- S Spectral Techniques

### **CONTENTS**

A. DIGITAL SIGNAL PROCESSING (DSP)

Iterative Algorithm for Hilbert Transform Based on FFT

Long Convolutions Using Number Theoretic Transforms

Wang Jianguo, Qiu Hueizhong and Huang Shunji

Huang Dishan and Tong Zhongfang

Liu Shutang and Yang Juping

A New Algorithm for 2" DWT

A Phase Unwrapping Algorithm
Marco Fratti

#### **VOLUME 1**

Fast Computation of the Real-Valued Split-Radix FFT  A.N. Skodras	
A New Fast Algorithm for Computing DFT of Real-Valued Sequence Qian Huisheng	
Packet Transmission of Broadcasting Quality Video Signal in ATM Networks  Cheolkie Kim and Chongsang Kim	]
Reduced Bandwidth Envelope Detectable Signals  M.K. Habib and A.A. Al-Obaidi	1
A Simple Structured Algorithm for the Discrete W Transforms  Zheng Baoyu	. 1
A Novel Efficient High-Resolution DFT Algorithm with Searching-for Mode Yang Jianyu, Xu Jie and Huang Shunji	2
A Very Fast Method to Perform Fourier Transforms  J.M. Wang	2
An Efficient Architecture for the Implementation of Fast Fourier Transforms Utilising Their Inherent Sequential and Parallel Aspects Mervyn Curtis and Nabil Ladjeroud	3
An Algorithm for Computing 2D-DWT-I (DHART) Based on Linear Congruences and Local Ring Structure  Ma Weizhen and Zhu Yuesheng	3
Some Consideration on the Short Time DFT and Its Application to the Hilbert Transformer  Masahichi Kishi	3
A New PFA Algorithm & Its Implementation with TMS320C30  Nong Bin and Wang Zhongde	4
Multirate Lattice Wave Digital Filter Banks and the Switched Capacitor Realizations for Signal Scrambling and Descrambling in Security Telephone System  Gu Qunshan and Du Xiyu	4
A Comparative Study of Quadrature Sampling and Direct Sampling of Bandpass Signals  Chung H. Lu, Danmei Chang and Ray Chapel	5

55

59

63

Network Method for K-L Transform and Its Application in Seismic Data*  Liu Xuewei and Li Yanda	71
Reconstruction of Finite Duration Signals from Their Incomplete and Noisy Spectrum Using ART-type Algorithms  Zhao Qiangfu, Wang Zhong and Ke Youan	75
ALDISP - An Applicative Realtime Language for DSP-Programming  Alois Knoll and Markus Freericks	79
Condition for Signal Reconstruction Using Phase Information Only Ye Long, Li Yanda and Chang Tong	83
Interpolation Via the Discrete Sine Transform Wang Zhongde and Wang Lifeng	87
The Sampling Theorem of Bandpass Signals Huang Youfang and Shen Yifei	91
On the Synthesis of Orthogonal Transforms*  Yang Yixian and Hu Zhengming	95
On the Design of Nonsymmetric Half-Plane 2-D Wave Digital Filters Using Lattice and Ladder Structures  Gu Qunshan and Du Xiyu	99
The Generalized Z-Transform Method for Solving a Class of Linear Time-Variant Discrete Systems  Wang Hongyu and Yin Fuliang	103
Roundoff Noise Analysis of Digital Allpass Structures  Bing Zeng and Yrjö Neuvo	107
Optimum Signal Design in Time-Frequency Plane Qu Jin, Z.Q. Luo and K.M. Wong	. 111
Arrival Determination of P and S Waves Using Wigner Distribution  Li Lihua and He Zhenya	115
Source Matching Problems Revisited  Laurence Wolfe and Chein-I Chang	119
Generalized Huber Deconvolution  Cheng Qiansheng and Sun Jing	123
A Modified CG Method for Deconvolution of Impulse Response Yu Zhiwu, Su Yi and Lu Zhongliang	127
Two-Dimensional Adaptive Modulation Adaptive Equalization of the Granular Noise	131
Feng Yumin and Jia Zhuosheng  On Continuous Nonessential Singularity of the Second Kind on T <sup>3</sup> for 3-D Digital Filters  Wang Lizhi and Du Xiyu	135
Long Convolutions Using Mersenne Number Theoretic Transforms  Liu Shutang and Yang Juping	139
Generalized Householder Transform and Its Application in Signal Eigenanalysis  She Zhishun and Zhu Zhaoda	141
A Nomogram for Determining FFT System Dynamic Range  Zhang Ning and Hong Mingchun	143
On the Property and Configuration of the Multi-Channel Compander Kuixi Yin and Masahichi Kishi	145
A New Phase Unwrapping Algorithm for Homomorphic Analysis Wei Gang, Ou-yang Jingzheng	147
Processing of Radial Arterial Pulses Chen Kekong, et al.	149
New Algorithms for GFT, Skew-cyclic Convolution and Cyclic Convolution and Their Realization	151

Simulation of Instantaneous Processes  Feng Diqing and Wang Feng	153
NBT Filter: Implementation and Application  Liu Jiancai, Ning Xinbao and Tan Xinshao	155
A New Algorithm for the Discrete Fourier Transform Shen Weiliang and Hao Chongyang	157
The Rapid Code Acquisition and Demodulation of Direct Sequence Spread-Spectrum Signal Using SAW Convolver Wan Janye, Zhang Xinbo and Qi Lianbao	1,59
A Study of Acquisition Performance in a Spread Spectrum Communication System Combined with a LMS Adaptive Array Wang Jiangi, Chen Xianfu and Zhang Eryang	161
Implementation of 64 Channels PCM/ADPCM Transcoder by Pipelining Processing Architecture  Xuan Jianhua, Dai Wenqi and Yao Qingdong	163
Properties of Cascade Connection of the Linear Time-Variant Discrete Systems and the Generalized Difference Transform Method Wang Hongyu and Yin Fuliang	165
The Research of the Adaptive Narrow-Band Cancellator Huang Yong and Wang Yongde	167
Processing of Electroencephalogram(EEG) Signals by Use of Fast Walsh Transform  Li Guomin	169
Necessary and Sufficient Condition for the Stability of a Class of 3-D Digital Filters with Nonessential Singularities of the Second Kind  Wang Lizhi and Du Xiyu	173
Multirate Approach to the Design of Narrow Band Fan Filters Gu Qunshan and Du Xiyu	175
The Construction and Property of Displace Orthogonal Function Wang Yue	179
B. SPECTRUM ESTIMATION AND MODELING	
Identification of Linear Part ARMA of Hammerstein Models by Using Higher-Order Statistics of Observed Data  Lin Pinxing and Mao Shiyi	183
A High Resolution Method for Spatio-Temporal Spectral Analysis Q.Y. Yin, R.W. Newcomb and L.H. Zou	187
Signal Subspace Approximation and Direction-of-Arrival Estimation  Liu Qingguang and Zou Lihe	191
A Study on Evaluation of High-Resolution Spectral Estimator by Cramer-Rao Bound	195
Jianguo Huang and Steven Kay	
An Order Recursive Multistage Least Squares (MSLS) Algorithm for Identifying Noisy ARMA Process Parameters  Zhao Pingya and Yu Daorong	199
A Frequency Estimation Method with High Resolution and Accuracy  Peng Lifang and He Dongguang	203
An Improved Method of Constructing Projection Matrix for DOA Estimation in Single Snapshot Case  Zhang Ming, Yang Wanlin and Li Leming	207
Advanced Signal Processing Techniques for Gravitational Wave Data Analysis  E. Acierno, V. Pierro and I.M. Pinto	211
A Hierarchical Algorithm for Estimating the Parameters of a Gaussian Mixture  Kuang Jinyu and Wei Fagiang	215

The Dynamic Stress Modal Analysis of Mechanical Structures  Tian Jifang and Huang Shilin	219
Identification of Nonlinear Dynamic Systems  J.J. Smyczek	<i>t</i>
Analysis of Human Muscle Fatigue by AR Spectral Estimation for the Surface EMG Signal  Li Qin, Huang Xiukun and Zhang Shujing	225
An Efficient Algorithm for High-Resolution Spectral Analysis  Sung-won Park	229
Maximum Likelihood Estimation of Multipath Time Delays  He Zhenya and Li Lihua	233
Recovery of the Acoustic Impedance From Band-Limited Seismograms  Zhao Bo and Fu Caifang	237
An Improved Projection Matrix Technique for Spatial Spectrum Estimation of Coherent Sources  Liu Deshu and Yin Chengyou	241
Estimating Parameters of Gaussian Mixtures Using Prony's Method Under the Condition of Same Mean-Standard Deviation Ratio  Shen Ting2hi	245
A High Resolution Method of Multiple Wide-Band Sources Bearing Estimation  Pan Bangyan	249
ARMA Spectral Estimation Based on High Order Linear Prediction and Cepstral  Analysis  S. H. Leung	253
A Novel Parametric Detection of an Unknown Sinusoid in AWGN Kiseon Kim	257
Generalized Projection Identification Algorithm Helmut Hoyer and Guanhua Wen	261
Locally Optimum Detection of Weak Signals in Non-Gaussian Noise  Liang Min and Sun Zhongkang	265
A New Fixed-Lag Identification-Smoother and Application to the Signal Process of Aircraft Spin Test  Shi Zhongke	269
Adaptive Eigensubspace Algorithms for Direction of Coherent Space Signal Sources  Qiu Peiliang, et al.	273
A Special Adaptive Notch Filter for Frequency Estimation Mu Li	277
On Block Smoothing for Spatio-Temporal Spectral Analysis of Coherent Sources Wang Zheng and Qian Huisheng	281
Adaptive Time-Variant Step LMS-DFE and Performances  Dai Wenqi and Zheng Shusheng	285
A New Algorithm on the Zoom Spectrum  Chen Zhonglin	289
An Improved Method of Extracting Poles of a Radar Target From Experiment  Data Using E-Pulse Technique  Zhu Yubin	291
A Study on the Combination Entropy of Multispectral Bands of MSS Imagery  Zhang Mingli and Li Chun	293
A New Method of Narrow-Band Spectrum Analysis Yang Wenlin	295
On the Relation Between Maximum Entropy Spectral Analysis (MEM2) and Homomorphic Spectral Estimation Method  Zhang Liang and Wu Zhaoxiong	297

SAW-CZT-Based Spectrometer for Use in Radio Telescope  Chen Dongpei, Gong Junjie and Zhou Tijian	299
Analysis of Uneven Spaced Signal Passing Through MTD Processor Yang Xiaojun and Duan Fengzeng	301
A Fuzzy Algorithm for Parameter Estimation Song Liuping and Liang Taiji	303
Predictive Deconvolution Method for Estimating the MA Parameters of an ARMA Process  Zou Peiguo	305
A New Algorithm for the ARMA Spectrum Estimation  Hu Dewen	309
The Application of STFA Technique on Estimating Tissue Ultrasonic Attenuation Yang Weifang	311
An Optimum Method of the LMS Adaptive Algorithm Under Noiseless Conditions  Liang Jun	313
An Approach to Improvement of Modal Frequency Resolution with Wide Frequency Band	315
Hu Zizheng, Sha Weiping and Wang You	
A New Algorithm for Building Models and Detecting Outliers with Qualitative Robust Estimates  Lu Pengfei	317
Estimation of Frequencies of Sinusoids in Noise with Colored Spectrum - Overdetermined Extended-Order Hanker Matrix SVD  Wang Yongde and Hu Ping	319
A New Method for Optimal ECG Signal Detection  J.L. Tian and J.X. Cheng	321
On the Two-Order Poles in the Rael Transient Signal with Noise Miao Chang, Feng Diqing and Zhao Ming	323
The Study of Adaptive Spectral Estimation to Frequency Hopping Signal Huang De Shuang and Zhu De Jun	325
Review and Prospect of the Minimum Cross-Entropy Spectral Estimation Technique Guo Yanying and Li Jiansan	327
A New Order-Recursive LMS Algorithm  Li Yong and Yu Bianzhang	329
A New Method for Arma Modeling Using Autocorrelation Lag Estimates  Cheng Qiming, Huang Xiukun and Zhang Shujing	333
C. SPEECH CODING AND ANALYSIS	
Speech Recognition Front-End Using Auditory Model  **Ara Samouelian**	337
A 2.4KBPS 2-MSLPC Speech Coder Offering Natural Sounding Speech  Zhu Qinglin and Xue Wanjing	341
Speech Enhancement by Recursive Estimation of Differential Path Transfer Functions  H.S. Dabis, T.J. Moir and D.R. Campbell	345
Design and Implementation of a Robust 2.4 KBPS HQ-LSP Vocoder  Ma Hongfei, Wang Dusheng and Fan Changxin	349
Improvement of Predictive Coding in APC Speech Coders  M. Salerno, et al.	353
New Contributions to Speech Coding At Bit Rates Between 9.6KB/S and 16KB/S  Guan Xutao, Zhu Qi and Xu Sijun	357

Applications of Holo-Spectrogram on Speech Signal Analysis Zheng Yi, et al.	361
Temporal Decomposition of Speech: Developments and Experiments at E.N.S.T. in Speech Analysis, Recognition and Synthesis  J.P. Tubach, et al.	365
Chinese All-Syllable Real-Time Synthesis System Mo Fuyuan, et al.	369
Speech Analysis Based on Bispectrum (Third Moments) Wang Renhua and Liu Yifei	373
An LPC Speech Synthesizer for Mandarin S N Koh, et al.	377
Voice Input Chinese Text Editer Yi Kechu, et al.	381
Simplified Algorithm for Excitation Pulse Search of MPLPC  Zhao Qifang and Zhu Weiming	385
A New HMM-Based Algorithm for Enhancing Noisy Speech Huang Zailu, Xie Jinhui and Wan Faguan	389
A New Speech Coding Method at Low Bit Rate Wang Yong and Ling Maoyong	393
Articulation Rules for Synthesis of Polysyllabic Words and Phrases in Standard Chinese  Yang Shunan	397
Performance Analysis of the Tasi System  Thien Vodai, Pierre Marchand and Naikang Ge	401
Possibilities of Voice Processing in Management Information Systems  Pierre Ardouin and Naikang Ge	405
Text-To-Speech Conversion in Chinese a Complete Rule-Based Synthesis System Huang Zailu and Ji Li	409
A New Pitch Detection Algorithm for Music and Speech Fang Yige and Zhu Weiming	413
A High Quality 16KB/S Speech Coder Yang Zhen and Zhen Baoyu	417
Processing of the Transform Coefficient for Analog Speech Encryption  Zhang Hailin and Wang Yumin	421
A New Hybrid Coding of Speech at 4.8 KBITS/S Shao Peitao, Wu Jiaan and Ma Hongfei	425
Korean Speech Synthesis Using Demisyllables Sungbin Im and Jae Hong Lee	429
High Order Linear Prediction Analysis Using Thinned Coefficients S.H. Leung, C.F. Chan and L.F. Peng	433
Vector Quantization of Speech and Speech-Like Waveforms with Variable-Rate Sampling Wu Jiaan and Shao Peitao	437
A Fast Algorithm for Generating VQ Codebook  Dong Zhixin and Zhang Youyou	439
Design of a PC-Based Digital Speech Spectrograph Liu Jiakang, Ke Youan and Lin Maoyong	441
D. SPEECH SYNTHESIS AND RECOGNITION	
Implementation of an Experimental Speaker Independent Discrete Utterance Recognition System	445

Application of Hidden Markov Model to Text-Dependent Speaker Recognition  Tetsuo Funada	449
The Temporal Modelling Problem of Hidden Markov Models for Speech Recognition  Jianing Dai, Iain G. MacKenzie and Jon E.M. Tyler	453
Recognition of Speaker-Dependent Isolated Chinese Word from the Whole Syllable Vocabulary Using TSVQ  Zheng Yuancheng, Yuan Baozong and Lin Biqin	457
Speaker Recogntion Using Dynamic Features of Speech and a Neural Network T. Kitamura, E. Hayahara and K. Hatayama	. 461
Codebooks and Neural Models for Speaker Identification  John Oglesby and John S. Mason	465
An Introduction to a Speaker Adaptation Method in Speech Recognition Systems Based on SPM Hao Ying and Fang Ditang	469
A Real-Time Speaker-Independent Speech Recognition System Based on SPM for 208 Chinese Words  Jiang Li, et al.	473
Isolated Chinese Word Recognition by Transformation Yang Shulin and Ke Youan	477
The Statistical Information Formulation for Noisy Speech Recognition  Ji Ming, Ke Youan and Lin Maoyong	481
Development of a Prototype Hearing System for Intelligent Robot Liu Chengxi, et al.	485
Parallel Production System Architectures for Use in Continuous Speech Recognition  Zhang Danqing and Iain Macleod	489
The AllA Speech Understanding System  Liang Mangui and Yuan Baozong	493
The Application of Fuzzy Mathematics to Speaker-Independent Isolated Word Recognition  Wang Shouyong and Xiong Yanren	497
Classification of Chinese Speech Based on Fuzzy Clustering Analysis  Gao Jun and Ke Youan	501
Chinese Speech Controlled Typewriter  Xu Bingzheng, Du Minghui and Qiu Wei	505
Impact of Signal Transmission Over the Local Telephone Network on Speech Recognition Technology  Harry M. Chang	509
A Comparative Study of Three Algorithms for Isolated Chinese Word Recognition Ma Haichao, Guan Hengshen and Yu Tiecheng	513
Design of an Isolated-Word ASR for the Spanish Telephone Network María Jesús Poza, José F. Mateos and Juan A. Siles	517
A Fast Algorithm in Speech Recognition to Eliminate the Difference Between Male and Female Voices  Lu Kan, Tseng Bendau and Lu Yingchun	521
Speech Recognition Using Two-stage Vector Quantization and HMM  Hu Zhiping	523
E. MULTIDIMENSIONAL SIGNAL PROCESSING	
Further Decorrelated Performance of Spatial Smoothing Techniques for Multipath Sources	527
Jar-Ferr Yang Churng-Tou Teai Hui-Tu Tie	

Clustering of Multidimensional Data  Talaat Salem El-Sheikh	531
Linear Diophantine Equations, Two-dimensional Arrays and the Discrete Fourier Transform  Claudia R.B. de Mello and R.M. Campello de Souza	53.
A New Adaptive Estimation Method for Two-Dimensional Sinusoidal Signals with White Noises  Huang Junqin, et al.	539
An On-line Implementation of the 2D-FHT at Megahertz Rates Angel M. Buron, et al.	543
A Linear Algorithm for 3-D Motion Estimation Based on the Orientation Invariance of Rotational Axis  Fan Hong and Yuan Baozong	547
A Unified Approach to Time- and Frequency-domain Realisation of Multidimensional Digital Signal Processing  Mohamed B.E. Abdelrazik	551
Feature Space Dimensionality Reduction by Using Local Representability  Josef Bigün and Caspar Horne	555
A New Algebraic Stability Condition for Two-dimensional Continuous Systems P. Agathoklis	1237
Multivariate Polynomial Transform and Its Applications  Jiang Zengrong and Wang Liguang	559
Fast Algorithm for Two-Dimensional W Transform Yang Dekun	561
F. VLSI FOR SIGNAL PROCESSING	
A Portable Instrument for Real-Time Measurement and Analysis of Biomedical Signals Using a TMS320C25 Microprocessor  J. Lin, et al.	565
VLSI Architectures for Digital Image Coding M. Yan and J.V. McCanny	124
High Speed Processing System Consist of TMS320C30, PC-386 and System Software  Li Changli, et al.	575
An Application-specific VLSI Synthesis Tool for Vector Quantisation Y. Hu, J.V. McCanny and M. Yan	579
A Fast, Efficient Convolver Chip Using Bit Level Systolic Array X.Y. Meng and R.B. Fun	583
A Real-time Multi-DSP System for Intensive Signal Processing  Hong Gang and Yuan Baozong	587
Real-time Implementation Two Kalman Filers: Matrix-based and UD Factorization Algorithms  Hen-Geul Yeh	591
The Development of a High Speed and Parallel DSP System to Realize Real-time Coherence of the Same Frequency Signals of the Incoherent Radars  Lü Rui, et al.	595
The Implementation of RPE-LTP with TMS320C25 DSP Yang Haiyun, Tang Kun and Qian Yasheng	599
Application of TMS32020 in Digital Signal Processing of a Large Sonar System  Cai Huizhi, Sun Zhen and Sun Changyu	603
An Architecture to Combine the Low-Level Processing with the High-level Processing of Computer Vision  Liang Dequn, Wang Ying and Cai Yuanlung	607
A Bit-serial Architectured FIR Filter	611