

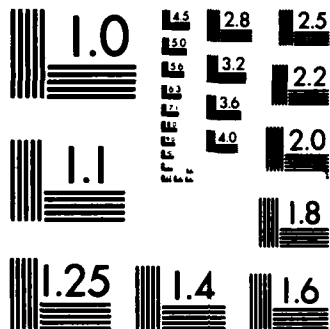
TWO-DIMENSIONAL SIGNAL PROCESSING AND STORAGE AND
THEORY AND APPLICATIONS. (U) GEORGIA INST OF TECH
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**ANNUAL REPORT APPENDIX
REPRINTS**

Joint Services Electronics Program

DAAG29-84-K-0024

January 1, 1986 - December 31, 1986



**TWO-DIMENSIONAL SIGNAL PROCESSING AND
STORAGE AND THEORY AND APPLICATIONS
OF ELECTROMAGNETIC MEASUREMENTS**

AD-A182 491

JANUARY 1987

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REPORT DOCUMENTATION PAGE

1a. REPORT SECURITY CLASSIFICATION Unclassified		1b. RESTRICTIVE MARKINGS	
2a. SECURITY CLASSIFICATION AUTHORITY		3. DISTRIBUTION/AVAILABILITY OF REPORT Approval for public release. Distribution unlimited.	
2b. DECLASSIFICATION/DOWNGRADING SCHEDULE			
4. PERFORMING ORGANIZATION REPORT NUMBER(S)		5. MONITORING ORGANIZATION REPORT NUMBER(S)	
6a. NAME OF PERFORMING ORGANIZATION Georgia Institute of Technology	6b. OFFICE SYMBOL (If applicable)	7a. NAME OF MONITORING ORGANIZATION U. S. Army Research Office	
6c. ADDRESS (City, State and ZIP Code) School of Electrical Engineering Atlanta, Georgia 30332		7b. ADDRESS (City, State and ZIP Code) Research Triangle Park, NC 27709	
8a. NAME OF FUNDING/SPONSORING ORGANIZATION U.S. Army Research Office	8b. OFFICE SYMBOL (If applicable)	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER DAAG29-84-K-0024	
8c. ADDRESS (City, State and ZIP Code)		10. SOURCE OF FUNDING NOS.	
		PROGRAM ELEMENT NO.	PROJECT NO.
11. TITLE (Include Security Classification) Two-Dimensional Signal Processing & Storage & Theory & Application of EM Measurements			
12. PERSONAL AUTHOR(S) Schafer, R. W. and Paris, D. T.			
13a. TYPE OF REPORT Annual	13b. TIME COVERED FROM 1-1-86 TO 2-31-86	14. DATE OF REPORT (Yr., Mo., Day) 87-1-1	15. PAGE COUNT
16. SUPPLEMENTARY NOTATION The views, opinions, and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other documentation.			
17. COSATI CODES		18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number) Signal processing, holographic storage, digital filtering, iterative signal restoration, multiprocessors optical computing, electromagnetic measurements.	
FIELD	GROUP		
19. ABSTRACT (Continue on reverse if necessary and identify by block number) This is an appendix to the annual report on research under the auspices of the Joint Services Electronics Program. The supplement consists of a printed table of contents and a set of microfiche containing all papers and theses produced under this contract. Specific topics covered are: digital signal processing, parallel processing architectures, two-dimensional optical storage and processing, hybrid optical/digital signal processing, electromagnetic measurements in time domain, and automatic radiation measurements for near-field and far-field transformations.			
20. DISTRIBUTION/AVAILABILITY OF ABSTRACT UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT ☐ DTIC USERS ☐		21. ABSTRACT SECURITY CLASSIFICATION Unclassified	
22a. NAME OF RESPONSIBLE INDIVIDUAL Ronald W. Schafer	22b. TELEPHONE NUMBER (Include Area Code) (404) 894-2917	22c. OFFICE SYMBOL	

ANNUAL REPORT APPENDIX

Joint Services Electronics Program
DAAG29-84-K-0024
January 1, 1986 - December 31, 1986

Publications
on

TWO-DIMENSIONAL SIGNAL PROCESSING AND STORAGE AND THEORY AND APPLICATIONS OF ELECTROMAGNETIC MEASUREMENTS

January, 1987
School of Electrical Engineering
Georgia Institute of Technology
Atlanta, Georgia 30332

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Per Mr. Bob Gordon, JSEP

I. Introduction

This supplement to the annual report consists of the following printed table of contents and a set of microfiche containing all papers and these produced with JSEP support and published during the period January 1, 1986 through December 31, 1986.

This compact presentation of a large quantity of information can be produced much more economically than printing. On the other hand, it is realized that microfiche is less convenient than a printed document. Therefore, those who are interested in particular reprints may contact R. W. Schafer to request a copy of any of the listed papers.

II. List of Reprints

The reprints are organized by work unit as in the Annual Report on this contract. Numbers in parenthesis indicate reference to fiche number and page. The page numbers are coded to the work unit numbers. Note that fiche number 1 contains the printed index that follows.

2.1 TWO-DIMENSIONAL SIGNAL PROCESSING AND STORAGE

Work Unit Number 1 - Multidimensional Digital Signal Processing

- 1.1 M.H. Hayes, "The Unique Reconstruction of Multidimensional Sequences From Fourier Transform Magnitude or Phase", to appear in *Image Recovery: Theory and Application*, Edited by H. Stark, Academic Press, 1986. (pages 1-1 to 1-37 on microfiche)
- 1.2 M.H. Hayes and M.A. Clements, "An Efficient Algorithm for Computing Pisarenko's Harmonic Decomposition Using Levinson's Recursion", *IEEE Trans. on Acoust., Speech, Sig. Proc.*, vol. ASSP-34, no. 3, pp. 485-491, June 1986. (pages 1-38 to 1-44 on microfiche)
- 1.3 C.E. Morris, M.A. Richards, and M.H. Hayes, "An iterative deconvolution algorithm with quadratic convergence", to appear in *Journal Optical Society America: A*, Jan. 1987. (pages 1-45 to 1-64 on microfiche)
- 1.4 M.H. Hayes, "Inverse Problems: An Overview", to appear in *J. of Soc. of Inst. and Control Engineers*, JAPAN (invited). (pages 1-65 to 1-79 on microfiche)
- 1.5 P. A. Maragos and R. W. Schafer, "Morphological Skeleton Representation and Coding of Binary Images," *IEEE Trans. Acoustics, Speech and Signal Processing*, vol. ASSP-34, No. 5, October, 1986. (pages 1-80 to 1-96 on microfiche)
- 1.6 Guessoum, A., and Mersereau, R. M., "Fast algorithms for the multidimensional discrete Fourier transform," *IEEE Transactions on Acoustics, Speech and Signal Processing*, vol. ASSP-34, pp. 937-943, August 1986. (pages 1-97 to 1-103 on microfiche)

- 1.7 Wilkes, D. M., and Hayes, M. H., "Spectral line tracking for nonstationary random processes", *Proc. 1986 Int. Conf. on Acoustics, Speech, and Sig. Proc.*, pp. 2347-2350, April 1986. (pages 1-104 to 1-107 on microfiche)
- 1.8 Karlsson, E., and Hayes, M. H., "ARMA modeling of time-varying systems with lattice filters", *Proc. 1986 Int. Conf. on Acoustics, Speech, and Sig. Proc.*, pp. 2335-2338, April 1986. (pages 1-108 to 1-111 on microfiche)
- 1.9 Hayes, M. H., Wilkes, D. M., and Mazel, D., "Iterative harmonic decomposition of nonstationary random processes and its application to spectral line tracking and speech encoding", *Proc. 1986 IEEE - Academia Sinica Workshop on Acoust., Speech, and Sig. Proc.*, pp. 55-58, Beijing, China, April 1986. (pages 1-112 to 1-115 on microfiche)
- 1.10 Morris, C. E., Richards, M. A., and Hayes, M. H., "An iterative deconvolution algorithm with exponential convergence", *Proc. Opt. Soc. Am. Topical Conf. on Signal Recovery*, pp. 112-115, Hawaii, April 1986. (pages 1-116 to 1-119 on microfiche)
- 1.11 Wilkes, D. M., and Hayes, M. H., "Symmetric Toeplitz matrices: A recursion for the eigenvalues", *Proc. 1986 Dig. Sig. Proc. Workshop*, pp. 7.7.1-7.7.2, October, 1986. (pages 1-120 to 1-121 on microfiche)
- 1.12 Morris, C. E., Richards, M. A., and Hayes, M. H., "An iterative deconvolution algorithm with p^{th} -order convergence", *Proc. 1986 Dig. Sig. Proc. Workshop*, pp. 4.8.1-4.8.2, October, 1986. (pages 1-122 to 1-123 on microfiche)
- 1.13 Maragos, P. A., and Schafer, R. W., "Applications of Morphological Filtering to Image Analysis and Processing," *Proc. 1986 Int. Conf. on Acoustics, Speech, and Signal Processing*, pp. 39.6.1-39.6.4. (pages 1-124 to 1-127 on microfiche)
- 1.14 AuYeung, C., Mersereau, R. M., and Schafer, R. W., "Maximum entropy deconvolution," *Proceedings 1986 IEEE International Conference on Acoustics, Speech and Signal Processing*, pp. 273-276. (pages 1-128 to 1-131 on microfiche)
- 1.15 Bevington, J. E., and Mersereau, R. M., "A random field model-based algorithm for textured image segmentation," *EUSIPCO-86, Third European Signal Processing Conference Signal Processing III: Theories and Applications* (Young et al. editors), pp. 909-912, 1986. (pages 1-132 to 1-135 on microfiche)

Work Unit Number 2 - Multiprocessor Architectures for Digital Signal Processing

- 2.1 Sae Hun Lee, "A Unified Approach to Optimal Multiprocessor Implementations from Non-parallel Algorithm Specifications," Ph.D. Thesis, Georgia Institute of Technology, October, 1986. (pages 2-1 to 2-277 on microfiche)
- 2.2 M. J. T. Smith and T. P. Barnwell, III, "Exact Reconstruction Techniques for Tree-Structured Subband Coders," *IEEE Transactions on ASSP*, June, 1986 (pages 2-278 to 2-311 on microfiche)

- 2.3 D. A. Schwartz, T. P. Barnwell, III and C. J. M. Hodges, "The Optimal Synchronous Cyclo-Static Array: A Multiprocessor Supercomputer for Digital Signal Processing," *1986 International Conference on Acoustics, Speech, and Signal Processing*, Tokyo, Japan, April, 1986. (pages 2-312 to 2-315 on microfiche)
- 2.4 S. H. Lee and T. P. Barnwell, III, "A Topological Sorting and Loop Cleansing Algorithm for a Constrained MIMD Compiler of Shift-Invariant Flow Graphs," *1986 International Conference on Acoustics, Speech, and Signal Processing*, Tokyo, Japan, April, 1986. (pages 2-316 to 2-319 on microfiche)
- 2.5 T. P. Barnwell III, "Algorithm Development and Multiprocessing Issues for DSP Chips," *SpeechTec '86*, New York, NY, April, 1986. (pages 2-320 to 2-324 on microfiche)
- 2.6 T. P. Barnwell III and D. A. Schwartz, "Cyclo-Static Solutions: Optimal Multiprocessor Realization of Recursive Algorithms," *Proc. of 1986 ASSP Workshop on VLSI and Signal Processing*, Los Angeles, CA, November, 1986. (pages 2-315 to 2-337 on microfiche)

Work Unit Number 3 - Two-Dimensional Optical Storage and Processing

- 3.1 Mirsalehi, M. M. and Gaylord, T. K., "Comments on direct implementation of discrete and residue-based functions via optimal encoding: A programmable array logic approach," *IEEE Transactions on Computers*, vol. C-35, pp. 829-830, September 1986. (pages 3-1 to 3-2 on microfiche)
- 3.2 Mirsalehi, M. M. and Gaylord, T. K., "Truth-table look-up parallel data processing using an optical content-addressable memory," *Applied Optics*, vol. 25, pp. 2277-2283, July 15, 1986. (pages 3-3 to 3-9 on microfiche)
- 3.3 Gaylord, T. K. and Mirsalehi, M. M., "Truth-table look-up processing: Number representation, multi-level coding, and logical minimization," *Optical Engineering*, vol. 25, pp. 22-28, January 1986. (invited). (pages 3-10 to 3-16 on microfiche)
- 3.4 Mirsalehi, M. M., Gaylord, T. K., and Verriest, E. I., "Integrated optical Givens rotation device," *Applied Optics*, vol. 25, pp. 1608-1614, May 15, 1986. (pages 3-17 to 3-23 on microfiche)
- 3.5 Mirsalehi, M. M., and Gaylord, T. K., "Logical minimization of multilevel coded functions," *Applied Optics*, vol. 25, pp. 3078-3088, September 15, 1986. (invited). (pages 3-24 to 3-34 on microfiche)
- 3.6 Moharam, M. G. and Gaylord, T. K., "Rigorous coupled-wave analysis of metallic surface-relief gratings," *Journal of the Optical Society of America A*, vol. 3, pp. 1780-1787, November 1986. (pages on 3-35 to 3-42 on microfiche)
- 3.7 Gaylord, T. K., Baird, W. E., and Moharam, M. G., "Zero-reflectivity high spatial-frequency rectangular-groove dielectric surface-relief gratings," *Applied Optics*, vol. 25, pp. 4562-4567, December 15, 1986. (pages 3-43 to 3-48 on microfiche)

Work Unit Number 4 - Two-Dimensional Optical/Electronic Signal Processing

- 4.1 Mait, Joseph N. and Rhodes, William T., "Two-pupil synthesis of optical transfer functions: 2-pupil function relationships," *Applied Optics*, Vol. 25 (15 June 1986), pp. 2003-2007. (pages 4-1 to 4-5 on microfiche)
- 4.2 Mait, Joseph N., "Existence conditions for two-pupil synthesis of bipolar incoherent point-spread functions," *Journal of the Optical Society of America A*, Vol. 3 (April 1986), pp. 437-445. (pages 4-6 to 4-14 on microfiche)
- 4.3 Mait, Joseph N., "Pupil-function design for bipolar incoherent spatial filtering," *Journal of the Optical Society of America A*, Vol. 3 (April 1986), pp. 1826-1832. (pages 4-15 to 4-21 on microfiche)
- 4.5 Mait, Joseph N., "Existence and synthesis of bipolar incoherent pointspread functions," in *Signal Recovery & Synthesis II*, Technical Digest of Optical Optical Society of America Topical Meeting, April 1986, Honolulu, pp. 27-30. (pages 4-22 to 4-25 on microfiche)
- 4.6 O'Neill, Kirt S. and Rhodes, William T., "Morphological Transformations by Hybrid Optical-Electronic Methods," in *Hybrid Image Processing*, D. Casasent and A. Teacher, eds. (Proc. SPIE, vol. 638, 1986), pp. 41-44. (pages 4-26 to 4-29 on microfiche)
- 4.7 Rhodes, William T., Stroud, Robert, and Gaynor, Edwin S., "Maximizing Diffraction Efficiency of Bleached Time-Integration-Exposure Silver-Halide Holograms," in *Holography Technical Digest* (Optical Society of America, 1986), pp. 96-99. (pages 4-30 to 4-33 on microfiche)

Work Unit Number 5 - Optimal Multiprocessor Structures for the Implementation of DSP Algorithms on High-Density Integrated Circuits

- 5.1 Schwartz, D. A. and Barnwell, T. P., III, and Hodges, C. J. M., "The Optimal Synchronous Cyclo-Static Array: A Multiprocessor Supercomputer for Digital Signal Processing," *Proc. of the International Conference on Acoustics, Speech and Signal Processing*, Tokyo, Japan, April 1986. (pages 5-2 to 5-4 on microfiche)
- 5.2 Schwartz, D. A., and Barnwell, T. P., III, "Cyclo-Static Solutions: Optimal Multiprocessor Realizations of Recursive Algorithms," Chapter 11, Editors S. Y. Kung, R. E. Owen and J. G. Nash, *VLSI Signal Processing II*, IEEE Press, N. J., 1986 (originally presented at the 1986 IEEE ASSP Workshop on VLSI Signal Processing, Nov. 1986, Los Angeles, California). (pages 5-5 to 5-17 on microfiche)

2.2 THEORY AND APPLICATIONS OF ELECTROMAGNETIC MEASUREMENTS

Work Unit Number 6 - Electromagnetic Measurements in the Time- and Frequency-Domains

- 6.1 Scott, W. R., Jr., and Smith, G. S., "Error analysis for Dielectric Spectroscopy Using Shielded Open-Circuited Coaxial Lines of General Length," *IEEE Trans. Instrumentation and Measurements*, Vol. IM-35, pp. 130-137, June 1986. (pages 6-1 to 6-8 on microfiche)
- 6.2 Scott, W. R., Jr., and Smith, G. S., "Dielectric Spectroscopy Using Monopole Antennas of General Electrical Length," *IEEE Trans. Antennas and Propagation*, Vol. AP-34, pp. 919-929, July 1986. (pages 6-9 to 6-19 on microfiche)
- 6.3 Scott, W. R., Jr., and Smith, G. S., "Error Corrections for an Automated Time-Domain Network Analyzer," *IEEE Trans. Instrumentation and Measurements*, Vol. IM-35, pp. 300-303, September 1986. (pages 6-20 to 6-23 on microfiche)
- 6.4 Scott, W. R., Jr., and Smith, G. S., "Dielectric Spectroscopy Using Monopole Antennas of General Electrical Length," 1986 International IEEE Antennas and Propagation Symposium, Philadelphia, PA, June 1986. (pages 6-24 to 6-27 on microfiche)

Work Unit Number 7 - Automated Radiation Measurements for Near- and Far-Field Transformations

- 7.1 Effenberger, J. A., Strickland, R. R., and Joy, E. B., "The Effects of Rain on a Radome's Performance," *Microwave Journal*, Vol. 29, No. 5, May 1986, pp. 261-274. (pages 7-1 to 7-7 on microfiche)
- 7.2 Joy, E. B., Wilson, R. E., Caraway, W. D., Hill, C., and Edwards, S. J., "Near Field Measurement of Radome Performance," *Proceedings of the Eighteenth Symposium on Electromagnetic Windows*, Atlanta, Georgia, September 17-19, 1986. (pages 7-8 to 7-13 on microfiche)
- 7.3 Joy, E. B., Wilson, R. E., Effenberger, J. A., Punnett, M. B., and Strickland, R., "The Electromagnetic Effects of Water on the Surface of a Radome," *Proceedings of the Eighteenth Symposium on Electromagnetic Windows*, Atlanta, Georgia, September 17-19, 1986. (pages 7-14 to 7-34 on microfiche)
- 7.4 Joy, E. B., and Wilson, R. E., "Spectral Evaluation of Reflector Surfaces Used for Compact Ranges," *Proceedings of the 1986 Antenna Measurement Techniques Association Workshop*, Philadelphia, PA, June 13, 1986. (pages 7-35 to 7-48 on microfiche)
- 7.5 Joy, E. B., and Wilson, R. E., "Spectral Evaluation of Reflector Surfaces Used for Compact Ranges," *Proceedings of the 1986 Antenna Measurement Techniques Association Meeting*, Ottawa, Canada, September 23-25, 1986. (pages 7-49 to 7-53 on microfiche)
- 7.6 Joy, E. B., Paik, N., Brewer, T. E., Wilson, R. E., Webb, R. P., and Meliopoulos, A.P., "Graphical Analysis of Square Ground Grids without Ground Rods in Uniform Soil," Appendix of the *IEEE Standard 80-1986, Guide for Safety in Substation Grounding*. (pages 7-54 to 7-59 on microfiche)

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