

DTIC FILE COPY

SOURCE

Northeastern University
Div. of Research Management
423 Lake Hall
Boston, Mass. 02115

Previous ONR Support

Contract: ONR-N00014-86-0219
Title: Research on Bispectrum Estimation
Period: April 1, 1986 - March 30, 1988
Principal Investigator: Chrysostomos L. Nikias

→ Significant results have been obtained during the first eighteen months of this research contract. We have ^{to} developed a new family of identification procedures for non-Gaussian white noise driven linear, time-invariant, nonminimum phase systems based on parametric modeling of higher-order cumulants using (i) non-causal AR, ^{Auto regression} (ii) forward-backward ARMA and (iii) cepstral modeling approaches. We have also developed ^{was developed} a new approach to time delay estimation in the presence of spatially correlated noise and have extended the results to a general array processing problem. The research productivity of this contract is summarized below: →

A. Journal Publications

- A.1 C.L. Nikias and M.R. Raghuveer, "Bispectrum Estimation: A Digital Signal Processing Framework" Proceedings IEEE, Vol. 75(7), July 1987.
- A.2 C.L. Nikias, "ARMA Bispectrum Estimation to the Identification of Nonminimum Phase Systems," IEEE Trans. Acous., Speech and Signal Processing, Accepted for publication in May 1987, in press.
- A.3 R. Pan and C.L. Nikias, "The Complex Cepstrum of Higher-Order Cumulants and Nonminimum Phase Signal Reconstruction", IEEE Trans. Acous., Speech, and Signal Processing, accepted for publication in May 1987, in press.
- A.4 R. Pan and C. L. Nikias, "Phase Reconstruction in the Trispectrum Domain," IEEE Trans. Acous., Speech, and Signal Processing, Vol. ASSP-35 (6), pp. 897-900, June 1987.
- A.5 C. L. Nikias and H. H. Chiang, "Higher-Order Spectrum Estimation via Non-Causal Autoregressive Bispectrum and Deconvolution," IEEE Trans. Acous., Speech, and Signal Processing, submitted on May 4, 1987.
- A.6 C.L. Nikias and R. Pan, "Time Delay Estimation in Unknown Gaussian Spatially Correlated Noise," IEEE Trans. Acous., Speech, and Signal Processing, submitted on May 16, 1987.

DISTRIBUTION STATEMENT A

Approved for public release;
Distribution Unlimited

S

SELECTE
MAY 8 1989

cb A

89 5 08 015

A.7 C.L. Nikias and R. Pan, "ARMA Modeling of Fourth-Order Cumulants and Phase Estimation, " Signal Processing, submitted on December 20, 1986.

B. Conference Publications

B.1 C. L. Nikias, "Parametric Trispectrum Estimation," Proc. Third ASSP Workshop on Spectrum Estimation and Modeling, pp. 17-20, Boston, MA, November 1986.

B.2 C. L. Nikias, and R. Pan, "Nonminimum Phase System Identification via Cepstrum Modeling of Higher-Order Cumulants, Proc. ICASSP '87, Dallas, TX, April 1987.

B.3 C. L. Nikias and H. H. Chiang, "Noncausal Autoregressive Bispectrum Estimation and Deconvolution" Proc. ICASSP '87, pp. , Dallas, TX, April 1987.

B.4 C. L. Nikias and R. Pan, "ARMA Modeling of Fourth-Order Cumulants." Proc. Intern. Conf. Signal Process., Florence, Italy, September 1987.

B.5 C. L. Nikias, "High-Order Spectrum Estimation," Proc. IEEE ASSP Mini Conference, pp. 14-24, Boston, MA, May 1987.

B.6 C. L. Nikias, "High-Order Spectral Analysis in Signal Processing," Proc. Canadian Centennial Engin. Convention, Montreal, Canada, May 1987.

C. Invited Seminar Talks

C.1 "Bispectrum Estimation: A Digital Signal Processing Framework" to the Digital Signal Processing Group, Sanders Associates, Nashua, NH, April 1986.

C.2 "Bispectrum Estimation: A Digital Signal Processing Framework" to the Department of Electrical Engineering, University of Toronto, Toronto, Canada, April 1986.

C.3 "Higher-Order Spectra and Signal Processing" to the Department of Engineering and Computer Science, Trinity College, Hartford, CT, March 1987.

C.4 "Nonminimum Phase Communication Channels and Higher-Order Spectra" to the IEEE Communications and Information Theory Chapter, Boston, MA, April 1987.

C.5 "Nonminimum Phase Signal Reconstruction and Deconvolution" to the High Tech Forums, Network Northeastern, Boston, MA, April 1987.

C.6 "Higher-Order Spectrum Estimation" Keynote Address to the IEEE ASSP Mini Conference, Boston, MA, May 1987.



Dist	Special
A-11	

- C.7 "Higher-Order Spectral Analysis in Signal Processing" Invited Address to the Canadian Engineering Centennial Convention, Montreal, Canada, May 1987.
- C.8 "Nonminimum Phase Communication Channels and Higher-Order Spectra" to the Department of Electrical Engineering, Communications Group, McGill University, Montreal, Canada, May 1987.
- C.9 "Higher-Order Spectral Analysis" to the IEEE Oceanic Engineering Society, Canadian Atlantic Chapter, Halifax, Nova Scotia, June 1987.