STUDY OF ONE- AND TWO-DIMENSIONAL FILTERING AND DECONVOLUTION ALGORITHMS FOR A STREAMING ARRAY COMPUTER

NASA GRANT NO. NSG 1648

FINAL REPORT

Appendix 5

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IOUP, GEORGE ELIAS

EDUCATION

1968 Ph.D., Physics, University of Florida
1962 S. B., Physics, Massachusetts Institute of Technology

EXPERIENCE

1977-	Assoc. Professor, Physics, University of New Orleans (UNO)
1969-1977	Asst. Professor, Physics, UNO, formerly LSUNO, New Orleans, LA
1968-1969	Asst. Professor, Physics, U. S. Coast Guard Academy, New London, CT
1967-1968	Postdoctoral Research Fellow, University of Connecticut, Storrs, CT
1964-1967	Research Assistant, University of Florida, Gainesville, FL
1962-1964	Teaching Assistant, University of Florida, Gainesville, FL
Summer-1962	Research Assistant, MIT Science Teaching Center, Cambridge, MA
Summers 1957-1961	Laborer, New Enterprise Stone & Lime Co., New Enterprise, PA

VISITING AND ADJUNCT POSITIONS

1980-1981	Adjunct Assoc. Professor, Physics, Xavier University of Louisiana
Summer 1979	NASA-ASEE Summer Faculty Fellow, Flight Electronics Division, NASA Langley Research Center.
Jan-May 1979	Visiting Scholar, Optical Sciences Center, University of Arizona.
Summer 1978	NASA-ASEE Summer Faculty Fellow, Analysis and Computation Division, NASA Langley Research Center.

MEMBERSHIP IN PROFESSIONAL AND HONORARY SOCIETIES

American Physical Society and Divisions (Elec. and Atomic Phys., Chem. Physics, Forum on Physics and Society)
Sigma Xi
Sigma Pi Sigma
Louisiana Section, American Association of Physics Teachers
Louisiana Academy of Sciences
Southeastern Section of the American Physical Society
Federation of American Scientists
Optical Society of America
Louisiana Science Teachers Association
Southeastern Geophysical Society

AWARDS (see also Visiting Positions)

L.S.U. System Distinguished Undergraduate Educator, 1976, Amoco Foundation, $1000.

PUBLICATIONS AND RESEARCH PAPERS

BOOKS

George E. Ioup, Analysis of Low Energy Atomic and Molecular Collisions: Semiclassical Elastic Scattering Calculations and Deconvolution of Data, Ph.D. Dissertation, University of Florida, 1968, 333 pages.

George E. Ioup, Editor, Proceedings of the Fourth Ocean Thermal Energy Conversion Conference, University of New Orleans, July, 1977, 632 pages.

JOURNAL AND PROCEEDINGS ARTICLES

G. E. Ioup and B. S. Thomas, "Smoothing and Unfolding the Data of Beam Collision Experiments," J. Chem. Phys. 46, 3959-61 (1967).

G. E. Ioup and B. S. Thomas, "Derivatives of the Classical Deflection Function," J. Chem. Phys. 50, 5009-15 (1969).

George E. Ioup, "Pre-college Teaching for Physicists in Louisiana," The Louisiana Physics Teacher, Vol. 4, No. 1, 15-17 (1974).

Hill, N. R. and G. E. Ioup, "Convergence of the van Cittert iterative method of deconvolution," J. Opt. Soc. Am. 66, 487-89 (1976).

* Juliette W. Ioup, George M. Wood, Jr., Billy T. Upchurch, George E. Ioup, and Grayson H. Rayborn, Jr., "Deconvolution of Mass Spectrometer Data," paper presented to the 28th Annual Conference of Mass Spectrometry and Allied Topics, May 1980, New York, NY. Paper published in Proceedings, 682-83 (1980).

* George M. Wood, Grayson H. Rayborn, Juliette W. Ioup, George E. Ioup, Billy T. Upchurch, and Samuel J. Howard, "Data Enhancement and Analysis through Mathematical Deconvolution of Signals from Scientific Measuring Instruments," paper presented before the International Congress on Instrumentation in Aerospace Simulation Facilities, September-October 1981, Dayton, Ohio. Paper published in '81 Record, 25-37 (1981).

* Ioup, George E., "An Introduction to Deconvolution," The Louisiana Physics Teacher, Vol. 7, 15-18 (1982).

* George E. Ioup and Juliette W. Ioup, "Iterative deconvolution," Geophysics 48, 1287-1290 (1983).

* Juliette W. Ioup, George E. Ioup, Grayson H. Rayborn Jr., George M. Wood Jr., and Billy T. Upchurch, "Iterative and Function - Continuation Fourier Deconvolution Methods for Enhancing Mass Spectrometer Resolution," Int. J. Mass Spectrom. and Ion Processes 55, 93-109 (1983/1984).

John D. McGlynn and George E. Ioup, "Phase coherency filtering of reflection seismic data," Geophysics 50, 1505-1509 (1985).

A.K.M. Sarwar, Juliette W. Ioup, and George E. Ioup, "Reconstruction of the Acoustic Impedance Log from the Fourier Components of the Seismogram Using One-Dimensional Inverse Theory," manuscript accepted for publication in the

Proceedings of the Society of Exploration Geophysicists and for presentation to the SEG, Oct 1985, Washington, D.C.

* Reginald Powe, George E. Ioup and Juliette W. Ioup, "A Comparison of Convergent Iterative Deconvolution Methods with the Least Squares Technique for Synthetic Seismic Data," manuscript accepted for publication in the Proceedings of the Society of Exploration Geophysicists and for presentation to the SEG, Oct 1985, Washington, D.C.

* Gary A. Ransford and George E. Ioup, "A Summary of Image Processing and Analysis Software," Naval Ocean Research and Development Activity (NORDA) Technical Note (submitted for publication).

RESEARCH PAPERS WITH PUBLISHED ABSTRACTS

G. E. Ioup and B. S. Thomas, "Derivatives of the Classical Deflection Function," paper presented before the American Physical Society, November 1968, Miami, FL. Abstracted in Bull. Am. Phys. Soc. 13, 1378 (1968).

Hill, N. R. and G. E. Ioup, "Convergence of van Cittert's Iterative Deconvolution Routine," paper presented before the Louisiana Academy of Sciences, April 1974, Lafayette, LA. Abstracted in Proceedings, XXXVII, 141 (1974).

Hill, N. R. and G. E. Ioup, "Limits of Resolution When Using Deconvolution Techniques," paper presented before the Louisiana Academy of Sciences, April 1974, Lafayette, LA. Abstracted in Proceedings, XXXVII, 141 (1974).

Field, R. L. and G. E. Ioup, "Gibbs Phenomenon and Resolution Enhancement," paper presented before the Louisiana Academy of Sciences, February 1976, Baton Rouge, LA. Abstracted in Proceedings, XXXXIX, 124 (1976).

Bivens, W. C. and G. E. Ioup, "Resolution Enhancement for Non-Fixed Linear Systems," paper presented before the Louisiana Academy of Sciences, February 1976, Baton Rouge, LA. Abstracted in Proceedings, XXXIX, 124 (1976).

Ioup, G. E., "A Survey of High School Physics in Louisiana," paper presented before the Louisiana Academy of Sciences, February 1976, Baton Rouge, LA. Abstracted in Proceedings, XXXI, 125 (1976).

George E. Ioup, "Properties of Morrison's Noise Removal for Deconvolution," paper presented before the American Physical Society, March-April 1976, Atlanta, GA. Abstracted in Bull. Am. Phys. Soc. 21, 382 (1976).

Ioup, G. E., "Convergence of van Cittert's Deconvolution for Functions of Finite Extent and Sampled Functions," paper presented before the Louisiana Academy of Sciences, February 1977, Shreveport, LA. Abstracted in Proceedings, XLI, 138 (1978).

Yoerger, E. J. and G. E. Ioup, "Application of van Cittert's Iterative Technique to Pictorial Enhancement," paper presented before the Louisiana Academy of Sciences, February 1978, Thibodaux, LA. Abstracted in Proceedings, XLI, 165 (1978).

Zeringue, A. J. and G. E. Ioup, "The Gibbs Phenomonon for Gaussian, Lorentzian, and Triangle Functions," paper presented before the Louisiana Academy of Sciences, February, 1978, Thibodaux, LA. Abstracted in Proceedings, XLI, 165 (1978).

* Whitehorn, K. A. and G. E. Ioup, "A Study of Discrete Fourier Transform Derivative Filters for One-and Two-Dimensional Physical Data," paper presented before the Louisiana Academy of Sciences, February 1980, Hammond, LA. Abstracted in Proceedings, XLIII, 195 (1980).

* Whitehorn, M. A. and G. E. Ioup, "Implementation of Two-Dimensional Convolution-Based Data Analysis Algorithms for a Streaming Array Computer," paper presented before the Louisiana Academy of Sciences, February 1980, Hammond, LA. Abstracted in Proceedings, XLIII, 195 (1980).

* Yoerger, E. J. and G. E. Ioup, "Convergence of Morrison's Noise Removal and van Cittert's Deconvolution for Two-Dimensional Data," paper presented before the Louisiana Academy of Sciences, February 1980, Hammond, LA. Abstracted in Proceedings, XLIII, 195 (1980).

* Zeringue, A. J. and G. E. Ioup, "Enhancement of Appearance Potential and Other Threshold Data Using the Discrete Fourier Transform," paper presented before the Louisiana Academy of Sciences, February 1980, Hammond, LA. Abstracted in Proceedings, XLIII, 195 (1980).

* Ioup, G. E., "Always-Convergent Iterative Noise Removal and Deconvolution," paper presented before the Louisiana Academy of Sciences, February 1981, Alexandria, LA. Abstracted in Proceedings, XLIV, 174 (1981).

* Whitehorn, M. A. and G. E. Ioup, "Always-Convergent Iterative Noise Removal and Deconvolution for Two-Dimensional Images," paper presented before the Louisiana Academy of Sciences, February 1981, Alexandria, LA. Abstracted in Proceedings, XLIV, 174 (1981).

Lawrence, M. Z., D. J. Ramsdale, and G. E. Ioup, "A Comparison of Numerical Beam-Forming Techniques for Non-Uniformly Spaced Hydrophone Arrays," paper presented before the Louisiana Academy of Sciences, February 1981, Alexandria, LA. Abstracted in Proceedings, XLIV, 175 (1981).

* Wright, K.A.R. and G. E. Ioup, "A Study of Morrison's Iterative Noise Removal Method," paper presented before the Louisiana Academy of Sciences, Feb 1981, Alexandria, LA. Abstracted in Proceedings, XLIV, 175 (1981).

* K. A. Whitehorn and G. E. Ioup, "Edge Detection Using the Derivative Theorem of Fourier Analysis," paper presented before the American Physical Society, November 1981, New Orleans, LA. Abstracted in Bull. Am. Phys. Soc. 26, 1213 (1981).

* G. E. Ioup, "Always-Convergent Iterative Noise Removal and Deconvolution," paper presented before the American Physical Society, November 1981, New Orleans, LA. Abstracted in Bull. Am. Phys. Soc. 26, 1213 (1981).

* M. A. Whitehorn and G. E. Ioup, "Always-Convergent Iterative Noise Removal and Deconvolution for Two-Dimensional Images," paper presented before the

American Physical Society, November 1981, New Orleans, LA. Abstracted in Bull. Am. Phys. Soc. 26, 1213 (1981).

* K.A.R. Wright and G. E. Ioup, "Optimum Use of Morrison's Noise Removal Method for Noise Mimimization," paper presented before the American Physical Society, November 1981, New Orleans, LA. Abstracted in Bull. Am. Phys. Soc. 26, 1213 (1981).

* Juliette W. Ioup and G. E. Ioup, "Optimum Use of Morrison's Noise Removal Method Prior to Linear Deconvolution," paper presented before the American Physical Society, November 1981, New Orleans, LA. Abstracted in Bull. Am. Phys. Soc. 26, 1213 (1981).

Dan J. Ramsdale, Mimi Zebrick Lawrence, and George E. Ioup, "A Comparison of Methods for Controlling Sidelobe Level in Uniformly-Spaced Arrays with Faulty Elements," paper presented to the Acoustical Society of America, December 1981, Miami Beach, FL. Abstracted in J. Acoust. Soc. Am. Suppl. 1, 70, 517-18 (1981).

* Stewart, M. G. and G. E. Ioup, "Computer Generated Analysis of tne Martin Filter Performance," paper presented before the Louisiana Academy of Sciences, February 1982, Lake Charles, LA. Abstracted in Proceedings, XLV, 193 (1982).

* Yoerger, E. J. and G. E. Ioup, "The Effect of Ad Hoc Constraints on Iterative Deconvolution," paper presented before the Louisiana Academy of Sciences, February 1982, Lake Charles, LA. Abstracted in Proceedings, XLV, 193 (1982).

* Edward J. Yoerger and George E. Ioup, "Frequency Domain Shaping of Ad Hoc Constraint Corrections in Iterative Deconvolution," paper presented before the Optical Society of American, October 1983, New Orleans, LA. Abstracted in J. Opt. Soc. Am. 73, 1875 (1983).

* Leclere, James H. and George E. Ioup, "Discrete Fourier Transform Inverse Filtering for Gaussian Response Functions," paper presented before the Louisiana Academy of Sciences, February, 1984, New Orleans, LA. Abstract to be published in Proceedings.

Sims, James A. and George E. Ioup, "Microprocessor Control of the UNO Telescope," paper presented before the Louisiana Academy of Sciences, February 1984, New Orleans, LA. Abstract to be published in Proceedings.

Ioup, Juliette W. and George E. Ioup, "Acoustic Reciprocity, Ray Reversibility, and Symmetry in Seismic Measurements," paper presented before the Louisiana Academy of Sciences, February 1984, New Orleans, LA. Abstract to be published in Proceedings.

McGlynn, John D. and George E. Ioup, "Spectral Coherency Filtering," paper presented before the Louisiana Academy of Sciences, February 1984, New Orleans, LA. Abstract to be published in Proceedings.

* George E. Ioup, Juliette W. Ioup, and M. Elaine Radford, "Application of Always-Convergent Iterative Noise Removal and Deconvolution to Seismic Data," paper presented at the Seismic Deconvolution Workshop of the Society of

Exploration Geophysicists, July 1984, Vail, Colorado. Abstracted in Geophysics, 50, 717 (1985).

* James H. Leclere, George E. Ioup and Juliette W. Ioup, "A Statistical Optimization Study of Iterative Noise Removal. I. For Noise Minimization," paper presented before the Louisiana Academy of Sciences, Natchitoches, LA, Feb 1985, abstract to be published in Proceedings.

* James H. Leclere, George E. Ioup and Juliette W. Ioup, "A Statistical Optimization Study of Iterative Noise Removal. II. Prior to Linear Deconvolution," paper presented before the Louisiana Academy of Sciences, Natchitoches, LA, Feb 1985, abstract to be published in Proceedings.

RESEARCH PAPERS

G. E. Ioup and B. S. Thomas, "Smoothing and Unfolding the Data of Beam Collision Experiments," paper presented before the Florida Academy of Sciences, March 1967, Tampa FL. Abstract distributed to participants.

George E. Ioup, "Noise Removal for Resolution Enhancement by Deconvolution," paper presented before the Louisiana Academy of Sciences, April 1973, Monroe, LA.

George E. Ioup, "Tomorrow's Energy," invited paper presented to the New Orleans Section, The Institute of Electrical and Electronics Engineers, November 18, 1976, New Orleans, LA.

George E. Ioup, "Energy Needs of Greater New Orleans," invited paper presented to the Greater New Orleans Broadcaster's Association, New Orleans, LA, April 20, 1978.

George E. Ioup, "Digital Image Processing," paper presented to NASA-ASEE Summer Faculty Fellows, NASA Langley Research Center, Hampton, VA, August 7, 1978. Extended abstract distributed to participants.

George E. Ioup, "Deconvolution of Two-Dimensional Images," invited paper presented at a short course, "Inversion Methods: Their Applications to Atmospheric Remote Sensing," sponsored by the Institute for Atmospheric Optics and Remote Sensing, Hampton, VA, August 13-17, 1978.

George E. Ioup, "Analysis of Spacecraft Radiometric Measurements," paper presented to NASA-ASEE Summer Faculty fellows, NASA Langley Research Center, Hampton, VA, August 2, 1979. Extended abstract distributed to participants.

Juliette W. Ioup and George E. Ioup, "Applications of Solar Energy in Oil Mill Processing," paper presented at the Oilseed Processing Clinic, New Orleans, LA, February 1980. Paper distributed to participants.

* George M. Wood, Billy T. Upchurch, George E. Ioup, Juliette W. Ioup, and Grayson H. Rayborn, "Computer Enhanced Measurements with a Medium Resolution Mass Spectrometer," paper presented before the Southeast Regional Meeting of the American Chemical Society, November 1983, Charlotte, NC. Abstract distributed to participants.

THESES DIRECTED

"Deconvolution for Resolution Enhancement," Norman Ross Hill III, December 1973.

"Resolution Enhancement for Non-Fixed Linear Systems," William C. Bivens, May, 1976.

"The Gibbs Phenomenon and Resolution Enhancement," Robert L. Field, August, 1976.

"The Gibbs Phenomenon for Gaussian, Lorentzian, and Triangle Functions," Alan J. Zeringue, December, 1977.

"Applications of Iterative Smoothing and Deconvolution Techniques to Two-Dimensional Images," Edward J. Yoerger, December, 1978.

"A Study of Derivative Filters Using the Discrete Fourier Transform," Kathleen A. Whitehorn, May, 1980.

"A Study of Morrison's Iterative Noise Removal Method," Karin A. R. Wright, July, 1980.

"A Comparison of Ambient Noise Models with Ambient Noise Measurements," Lawrence J. Fusillo, May, 1981 (Dr. Thomas M. Davis, co-director).

"Always-Convergent Iterative Noise Removal and Deconvolution for Image Data," Mark A. Whitehorn, December, 1981.

"A Comparison of Beam-Forming Techniques for Hydrophone Arrays with Missing Elements," Mimi Zebrick Lawrence, December 1981 (Dr. Dan J. Ramsdale, co-director).

"Channel Digit Response for a Stationary Source and Receiver," Nils Paz, December, 1983, (Dr. William J. Jobst, co-director).

"Optimum Use of Morrison's Iterative Method of Noise Removal for Deconvolution," James Henry Leclere, August, 1984.

"A Comparison of Convergent Iterative Deconvolution Methods with the Least Squares Technique for Synthetic Seismic Data," Reginald Powe, August, 1985.

GRANTS RECEIVED (PRINCIPAL INVESTIGATOR OR MAJOR PARTICIPATION)

Research Grant, University of New Orleans Research Council, Summer 1971.

Physics of Music Course Development, Ford Foundation Venture Fund, Summer 1974, with Professor E. Beeson.

Physics of the Environment Course Development, Ford Foundation Venture Fund, Fall 1974, with Professor C. Bergeron.

Undergraduate Research Participation, supervision of research on Resolution Enhancement for Geophysical Data, National Science Foundation, Summer 1975, Professor T. Siddall, principal investigator.

"A Cooperative Program for Secondary School Science in Louisiana," instructor University of New Orleans section, National Science Foundation, Summer 1975, Professor L. Dureau, principal investigator.

"Energy Today and Tomorrow," teacher-demonstrator for Oak Ridge Associated Universities energy program in Louisiana, Louisiana Power and Light, Gulf States Utilities, New Orleans Public Service, and Central Louisiana Electric Company, 1975-76, with Professor D. Kern, coordinator.

Fourth Ocean Thermal Energy Conversion Conference, March 1977, organize conference and edit Proceedings, Energy Research and Development Administration (now DOE), January-August 1977, with Dr. D. Mayer.

"Enhancement of Appearance Potential Spectroscopy Data by Noise Removal and Deconvolution," National Aeronautics and Space Administration, October 1977 - August 1978, renewed September 1978 - August 1979, renewed September 1979 - August 1980, principal investigator.

Sabbatical Leave Award, University of New Orleans, spring 1979.

"Study of One-and Two-Dimensional Filtering and Deconvolution Algorithms for a Streaming Array Computer," National Aeronautics and Space Administration, September 1979 - September 1980, renewed October 1980 - December 1981, principal investigator.

"A Comparison of Beam-Forming Techniques for Non-Uniformly Spaced Hydrophone Arrays," Office of Naval Research, March 1981 - November 1981, principal investigator.

Faculty Summer Scholar Award, University of New Orleans, summer 1984.

"Optimal Application of Morrison's Iterative Noise Removal for Deconvolution," National Aeronautics and Space Administration, June 1984 - December 1984, renewed February 1985 - January 1986, principal investigator with Dr. Juliette Ioup.

GRANT PARTICIPATION

AEC Summer Institute for College Teachers on the Energy Crisis, lectures on Energy Conservation and on Climate Modification, University of New Orleans, Atomic Energy Commission, Summer 1974, Professor C. Bergeron, principal investigator.

"Science, Technology and Man," lectures on "The Meaning of the Energy Crisis," National Science Foundation and Tulane University, 1976-77, Professor H. Hrubecky and R. Ebel, principal investigators.