

DOCUMENTATION PAGE

AD-A264 705



2. REPORT DATE

3. REPORT TYPE AND DATES COVERED
FINAL/01 NOV 89 TO 31 OCT 92

4. TITLE AND SUBTITLE

"ANALYSIS AND COMPUTATION FOR
VORTEX DYNAMICS AND RAREFIED GASES" (U)

5. FUNDING NUMBERS

6. AUTHOR(S)

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2304/AA
AFOSR-90-0013

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

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8. PERFORMING ORGANIZATION
REPORT NUMBER

AFOSR-TR- *93-11304*

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

AFOSR/NM
110 DUNCAN AVE, SUTE B115
BOLLING AFB DC 20332-0001

10. SPONSORING/MONITORING
AGENCY REPORT NUMBER

AFOSR-90-0013

11. SUPPLEMENTARY NOTES

**DTIC
ELECTE
MAY 21 1993
S E D**

93-11304



12a. DISTRIBUTION/AVAILABILITY STATEMENT

APPROVED FOR PUBLIC RELEASE: DISTRIBUTION IS UNLIMITED

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13. ABSTRACT (Maximum 200 words)

The researchers have developed a variety of adapted orthogonal transforms for signal compression and analysis. These methods have been used successfully in sound and high resolution image compression and are currently being tested for their technological value. In parallel, the best basis algorithm has been used by K. Sreenivasan for analysis of experimental turbulence data, and by M. Farge and V. Wickerhauser for the analysis of simulated two dimensional vorticity fields. This analysis permits a more careful comparison between simulation and experiment by detecting subtle differences in structures. By extracting coherent structures in the flows it promises to permit efficient tracking of these structures. In particular, as a result of testing by the FBI and Scotland Yard, a variant of these algorithms has been chosen for as a standard for fingerprint image compression with an estimated initial saving to the FBI in storage hardware alone of \$25,000,000. These methods are also being tested, in collaboration with Martin Marietta, for automatic target recognition.

14. SUBJECT TERMS

15. NUMBER OF PAGES

2

16. PRICE CODE

17. SECURITY CLASSIFICATION
OF REPORT

UNCLASSIFIED

18. SECURITY CLASSIFICATION
OF THIS PAGE

UNCLASSIFIED

19. SECURITY CLASSIFICATION
OF ABSTRACT

UNCLASSIFIED

20. LIMITATION OF ABSTRACT

SAR

AFOSR Wavelet Analysis Grant # AFOSR-90-0013 Final Report Dec 1992

Wavelet Analysis and Signal Processing.

R. Coifman, in collaboration with V. Wickerhauser, has developed a variety of adapted orthogonal transforms for signal compression and analysis. These methods have been used successfully in sound and high resolution image compression and are currently being tested for their technological value.

In parallel, the best basis algorithm has been used by K. Sreenivasan for analysis of experimental turbulence data, and by M. Farge and V. Wickerhauser for the analysis of simulated two dimensional vorticity fields. This analysis permits a more careful comparison between simulation and experiment by detecting subtle differences in structures. By extracting coherent structures in the flows it promises to permit efficient tracking of these structures. In particular, as a result of testing by the FBI and Scotland Yard, a variant of these algorithms has been chosen as a standard for fingerprint image compression (with an estimated initial saving to the FBI in storage hardware alone of \$25,000,000).

These methods are also being tested, in collaboration with Martin Marietta, for automatic target recognition. The detailed properties of frequency localization of wavelet packets have been understood, indicating some loss of localization for high frequency numbers, see ref. To circumvent these limitations Meyer and Coifman have constructed localized trigonometric orthogonal bases. These new libraries of o.n bases can be used in conjunction with the best basis algorithm to provide good parameter extraction and compression methods. These are being tested and compared to other methods now.

In particular, the local trigonometric bases are ideally suited for fast computational tasks involving oscillatory problems such as solution of acoustic and electromagnetic scattering. Software for testing these methods has been developed by Fang, who also showed their efficiency as numerical tools.

Software permitting testing and evaluations of the tools mentioned above is being developed in a variety of formats and configurations and is being made available by ftp.

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NTIS CRA&I	☒
DTIC TAB	☐
Unannounced	☐
Justification	
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Distribution /	
Availability Codes	
Dist	Avail and/or Special
A-1	