AFIP FILE COPY

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

(2)

1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	29 Jan 82	Final, 1 Sep 80-31 Aug 81

4. TITLE AND SUBTITLE
MATHEMATICAL FOUNDATIONS OF THE SINGULARITY EXPANSION METHOD

5. FUNDING NUMBERS
PE61102F
2304/A4

6. AUTHOR(S)
L. Wilson Pearson

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
University of Kentucky
Department of Electrical Engineering
Lexington KY 40506

8. PERFORMING ORGANIZATION REPORT NUMBER
559

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)
AFOSR
BLDG 410
BAFB DC 20332-6448

10. SPONSORING/MONITORING AGENCY REPORT NUMBER
AFOSR-80-0269

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION/AVAILABILITY STATEMENT

12b. DISTRIBUTION CODE

13. ABSTRACT (Maximum 200 words)
This final report summarizes results of the meeting conducted at the University of Kentucky, 19-21 November 1980, entitle "Mathematical Foundations of the Singularity Expansion Method". The proceedings of the meeting are being reported as a special issue of the journal Electromagnetics (Vol. 1, No. 4); it should be available in the near future. Included in the final report is a list of titles and authorship which will appear in the above mentioned issue of Electromagnetics.

14. SUBJECT TERMS	15. NUMBER OF PAGES
	5
	16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
unclassified	unclassified		

NSN 7540-01-280-5500

Standard Form 298 (890104 Draft)
Prescribed by ANSI Std. 239-18
298-01

The University of Mississippi
School of Engineering
University Mississippi 38677

Department of Electrical Engineering

(601) 232-7231

January 29, 1982

Dr. Robert N. Buchal
AFOSR/NM
Bolling AFB
Washington, DC 20332

AFOSR-TR- 82-1559

Subject: Final Report for Grant No. AFOSR-80-0269

Dear Dr. Buchal:

The above-referenced grant from the Air Force Office of Scientific Research to the University of Kentucky Research Foundation supported the conduct of a meeting among selected scientist entitled "Mathematical Foundations of the Singularity Expansion Method," held 19-21 November, 1980 at the Carnahan House meeting center of the University of Kentucky in Lexington, Kentucky. Dr. Lennart Marin of the Dikewood Corporation, Santa Monica, California, served as moderator for the meeting and I was organizer. In addition, twelve scientist—six engineering scientists and six mathematicians—were present as invited participants and their travel and subsistence costs were defrayed using grant funds. The "Principal Participants" list attached indicates names and addresses of those who were present. In addition, we circulated invitations within the singularity expansion research community for those who would like to attend the meeting at their own expense as observers. The "Additional Attendees" list attached provides the names and addresses of these individuals.

In my opinion the intent of this meeting to bring together engineering scientists and mathematicians to discuss matters of detail and of rigor pertaining to the singularity expansion method was well served. The discussions were quite open and frank and, as best I could observe, there was a substantial amount of interchange in private conservations among participants when meeting sessions were adjourned In the year since the meeting, new results related to SEM have emerged through thinking stimulated at the meeting.

The proceedings of the meeting are being reported as a special issue of the journal *Electromagnetics* (vol. 1, no. 4) which is at the printers at this writing. Each of the invited participants except for Professors Howland and Mittra have prepared manuscripts which are included in this special issue. (Professor Howland felt that his own work was not closely enough related to the singularity expansion method to allow him to make

a significant contribution to this volume and Professor Mittra had no new results to report.) In addition, Professor Herbert Überall of the Catholic University, Washington, DC, has prepared a manuscript which is included in this volume. Professor Überall's work in acoustic scattering bears heavily on the singularity expansion method in electromagnetics and he would have been included in the invitation list had we been aware of his work earlier. I have included a listing of the paper titles and authorship in this special issue and will provide you with copies of the issue as soon as they are available to me within the next few weeks.

I should acknowledge the assistance of several people in the successful conduct of this meeting. Professor C. L. Dolph of the University of Michigan was most helpful in planning this meeting from its conception. He proved a useful resource in identifying mathematicians who should receive invitations to the meeting and contributed to the discussions during its conduct. Dr. Carl E. Baum of the Air Force Weapons Laboratory provided the same sort of council in connection with the engineering scientists list. Dr. Marin in serving as moderator and subsequently as co-editor with me for the special issue of *Electromagnetics*. We gratefully acknowledge your own support both in the form of encouragement and the financial support through the physics directorate of AFOSR in making this meeting a reality.

Cordially,

L. Wilson Pearson

L. Wilson Pearson, Ph.D.
Associate Professor

LWP:teb

Enclosure

cc: Susan Aylward, UKRF
Benjamin Leon

PRINCIPAL PARTICIPANTS: Mathematical Foundations of the Singularity Expansion Method

MODERATOR

Dr. Lennart Marin
Dikewood Corporation
2716 Ocean Park Blvd. Suite 3000
Santa Monica, CA 90405 (213) 450-5772

ORGANIZER

Prof. L. Wilson Pearson
Dept. of Electrical Engineering
University of Kentucky
Lexington, KY 40506 (606) 257-1644

SPONSOR'S REPRESENTATIVE

Dr. Robert N. Buchal
AFOSR/NM
Bolling AFB
Washington, DC 20332 (202) 767-4939

PARTICIPANTS

ENGINEERING SCIENTISTS

Dr. C. E. Baum
Air Force Weapons Laboratory
Kirtland AFB, NM 87117 (505) 844-9816

Prof. D. R. Wilton
Department of Electrical Engineering
University of Mississippi
University, MS 38677 (601) 232-7231

Prof. Raj Mittra
Electromagnetics Laboratory
Department of Electrical Engineering
University of Illinois
Urbana, IL 61801 (217) 333-1202

Prof. Chen-To Tai
Radiation Laboratory
Department of Electrical Engineering
University of Michigan
Ann Arbor, MI 48104 (313) 764-0500

Dr. F. M. Tesche, Scientist
LuTech, Inc.
P. O. Box 1263
Berkeley, CA 94701 (415) 843-1504

Dr. M. I. Sancer
R & D Associates
P. O. Box 9695
Marina del Rey, CA 90291

MATHEMATICIANS

Prof. C. L. Dolph
Department of Mathematics
University of Michigan
Ann Arbor, MI 48104 (313) 764-8586
662-1388

Prof. A. G. Ramm
Department of Mathematics
University of Michigan
Ann Arbor, MI 48104 (313) 763-5862
996-4631

Prof. Ralph Kleinman
Department of Mathematics
University of Delaware
Newark, DE 19711 (302) 738-2250

Prof. James Howland
Department of Mathematics
University of Virginia
Charlottesville, VA 22904
(804) 924-0311

Prof. Bob Ritt
Department of Mathematics
Illinois State University
Normal, IL 61761 (309) 436-6681

Prof. Calvin H. Wilcox
Department of Mathematics
University of Utah
Salt Lake City, UT 84112
(801) 581-6131

(Sabbatical, Fall, 1980)

ADDITIONAL ATTENDEES

MATHEMATICAL FOUNDATIONS OF THE SINGULARITY EXPANSION METHOD

November 19-21, 1980

Darrell Acree
Department of Electrical Engineering
University of Kentucky
Lexington, KY 40506

J. R. Auton
Effects Technology, Inc.
5383 Hollister Avenue
Santa Barbara, CA 93111

Hriar Cabayan
L-156 Lawrence Radiation Lab.
P. O. Box 808
Livermore, CA 94551

Michael Cadilhac
Laboratoire D'Optique Electromagnetique
Equipe De Recherche associee au C.N.R.S.
Faculte des Sciences and Techniques
Centre de St-Jerome
13397 Marseille Cedex 4
France

J. Philip Castillo
AFWL/NTYE
Kirtland AFB
Albuquerque, NM 87117

R. Dawson Coblin
Department of Electrical Engineering
University of Kentucky
Lexington, KY 40506

William A. Davis
Virginia Polytechnic Institute
Department of Electrical Engineering
Blacksburg, VA 24060

Arne Jensen
Department of Mathematics
University of Kentucky
Lexington, KY 40506

Robert Jensen
Department of Mathematics
University of Kentucky
Lexington, KY 40506

William A. Johnson
Science Applications, Inc.
Suite A-214
5055 E. Broadway
Tucson, AZ 85711

Louis F. Libelo
Code R43, Electromagnetics Branch
U.S. Naval Surface Weapons Center
White Oak, Silver Spring, MD 20910

G. Bruce Melson
Department of Electrical Engineering
University of Kentucky
Lexington, KY 40506

Krys Michalski
Department of Electrical Engineering
University of Kentucky
Lexington, KY 40506

R. Petit
Laboratoire D'Optique Electromagnetique
Equipe De Recherche associee au C.N.R.S.
Faculte des Sciences et Techniques
Centre de St-Jerome
13397 Marseille Cedex 4
France

Yahya Rahmat-Samii
California Institute of Technology
Jet Propulsion Lab. - MS 161-205
4800 Oak Grove Drive
Pasadena, CA 91103

Frank Rizzo
Department of Engineering Mechanics
University of Kentucky
Lexington, KY 40506

John Roberts
Department of Electrical Engineering
University of Kentucky
Lexington, KY 40506

Tapan Sarkar
Department of Electrical Engineering
Rochester Institute of Technology
Rochester, NY 14623

Herbert Uberall
Department of Physics
Catholic University
Washington, DC 20064

Clasine van Winter
Department of Mathematics
University of Kentucky
Lexington, KY 40506

CONTENTS OF SPECIAL ISSUE OF ELECTROMAGNETICS