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Education

Ecole Nationale Superieure d'Ingenieur Arts et Metiers, Paris, France, 1958-1962, Diplome d'Ingenieur, 1962.
Ecole Superieure d'Electricitee, Paris, France, 1962-1964, Diplome d'Ingenieur, 1964.
University of California, Department of Electrical Engineering and Computer Sciences, Berkeley, California, 1966-1970, M.S. 1967, Ph.D. 1970.

Research Interests

Optimization Algorithms: Our interests in optimization algorithms are primarily directed towards the synthesis of efficient algorithms for large scale, ill conditioned problems, and the systematic methods needed to analyze their convergence. In that general area, and in collaboration with Dr. L.J. Podrazik from the Center for Computing Sciences of the Institute for Defense Analysis, I am working on maximizing highly non-linear functions on cartesian products of unit simplices using radial projection methods.

Modelling of Parallel Machines: The effective use of modern computing machines requires the synthesis of the appropriate models to quantify machine behavior as a function of algorithm implementation. The challenge lies in proposing models that are as simple as possible, and yet precise enough to allow the determination of algorithm implementation parameters with the desired accuracy. In the context of the Department of Defense High Performance Computing Program, we have access to most types of parallel machines, that is vector processors (Cray 90), distributed memory machines (Thinking Machine CM5, Cray T3D), message passing multicomputers (Intel Paragon, IBM SP2) shared memory machines (SGI Challenge). Our research efforts to date have resulted in useful models for both synchronized distributed memory machines and shared memory machines.

Parameterized Parallel Numerical Algorithms: Rapid solution of linear algebra problems is fundamental in many real time situations, for example adaptive beam forming. In that context it is necessary to have algorithms that possess the degree and type of parallelism that matches the target hardware. In order to solve that difficulty, we are investigating a parameterized approach

to algorithm synthesis that is based on the segmenting of the computations into arithmetic grains, and in parameterizing the assignment of the grains to the computational streams. The approach has been used on the parallel QR factorization problem, using both the fast Givens and Householder methods, and on the SOR algorithms (Jacobi, red-black, and Gauss-Seidel) for solving elliptic partial differential equations.

Professional Experience

1964-1966: Research Engineer, Service Technique des Constructions et Armes Navales, 16 rue Emeriau, Paris 15, France.

1967-1970: Research Assistant Department of Electrical Engineering and Computer Sciences, University of California, Berkeley, California.

1970-1971: Research Associate, Department of Electrical Engineering, University of Southern California, Los Angeles, California.

1971-1972: Assistant Professor, University of Southern California, Los Angeles California.

1972-1973: Visiting Assistant Professor, Electrical Engineering Department, The Johns Hopkins University, Baltimore, Maryland.

1973-1976: Assistant Professor, Electrical Engineering Department, The Johns Hopkins University, Baltimore, Maryland.

1976-1977: Visiting Associate Professor, Electrical Engineering Department, North Carolina State University, Raleigh.

1976-1981: Associate Professor, Electrical Engineering Department, The Johns Hopkins University, Baltimore, Maryland.

1981- : Professor, Electrical and Computer Engineering Department, The Johns Hopkins University, Baltimore, Maryland.

1999-2008 : Chair, Electrical and Computer Engineering Department, The Johns Hopkins University, Baltimore, Maryland.

2008- : Professor, Electrical and Computer Engineering Department, The Johns Hopkins University, Baltimore, Maryland.

Present Duties

Teaches courses in digital logic, computer architecture, parallel computing, algorithm design, and perform research in Optimization theory, Optimal control, Numerical methods for optimization, Theory of convergence for iterative procedures, Anti-jamming schemes for iterative procedures, Parallel computer architectures, Parallel implementations of algorithms for optimal control problems, System level fault models, Fault analysis and algorithms for fault diagnosis, Error detection schemes for parallel computations, Fault tolerant implementations of algorithms for optimal control problems, Imaging and image processing.

Publications

1. G. G. L. Meyer and E. Polak, A decomposition algorithm for solving a class of optimal control problems, *J. Mathematical Analysis and Applications,* Vol. 32, No. 1, October 1970, pp. 118-140.

2. G. G. L. Meyer and E. Polak, Abstract models for the synthesis of optimization algorithms, *SIAM J. on Control,* Vol. 9, No. 4, November 1971, pp. 547-560.

3. G. G. L. Meyer and H. Payne, An iterative method of solution of the algebraic Riccati equation, *IEEE Trans. on Automatic Control,* Vol. AC-17, No. 4, August l972, pp. 550-551.

4. G. G. L. Meyer, A drivable method of feasible directions, *SIAM J. on Control,* Vol. 11, No. 1, February 1973, pp. 113-118.

5. G. G. L. Meyer, Non-wastefulness of interior iterative procedures, *J. Math. Anal. Applications,* Vol. 45, No. 2, February 1974, pp. 485-496.

6. G. G. L. Meyer, A segmented algorithm for solving a class of state constrained discrete optimal control problems, *IEEE Trans. on Automatic Control,* Vol. AC-19, No. 2, April 1974, pp. 134-136.

7. G. G. L. Meyer, Algorithm model for penalty functions-type iterative procedures, *J. of Computer and System Sciences,* Vol. 9, No. 1, August 1974, pp. 20-30.

8. G. G. L. Meyer, Accelerated Frank-Wolfe algorithms, *SIAM J. on Control,* Vol. 12, No. 4, November 1974, pp. 655-633.

9. G. G. L. Meyer, A canonical structure for iterative procedures, *J. Mathematical Analysis and Applications,* Vol. 52, No. 1, October 1975, pp. 120-128.

10. G. G. L. Meyer, A systematic approach to the synthesis of algorithms, *Numerische* , Vol. 24 (1975), pp. 277-289.

11. G. G. L. Meyer and W. Rugh, editors, *Proceedings of the 1976 Conference on Information Sciences and Systems,* Baltimore, Maryland, 1976.

12. G. G. L. Meyer, Conditions de convergence pour les algorithmes iteratifs monotone autonomes et nondeterministes, *Revue Francaise d'Automatique, Informatique et Recherche Operationnelle, Serie Rouge, Analyse Numerique,* Vol. 11, No. 1, April 1977, pp. 61-74.

13. G. G. L. Meyer, A finitely solvable class of approximating problems, *SIAM J. on Control* and *Optimization,* Vol. 15, No. 3, May 1977, pp. 400-406.

14. G. G. L. Meyer, Convergence conditions for a type of algorithm model, *SIAM J. on Control and Optimizations,* Vol. 15, No. 5, August 1977, pp. 779-784.

15. G. G. L. Meyer, Effectiveness of multi-microprocessor networks for solving the nonlinear Poisson equation, in *High Speed Computer and Algorithm Organization,* D. J. Kuck, D. H. Lawrie and A. H. Sameh Ed., Academic Press, Inc., New York 1977, pp. 323-326.

16. G. G. L. Meyer, Methods of feasible directions with increased gradient memory, *Lecture Notes in Control and Information Science,* Vol. 7, Part 2, Edited by J. Stoer, Springer-Verlag, Berlin 1978, pp. 87-93.

17. G. G. L. Meyer and G. Masson, An efficient fault diagnosis algorithm for symmetric multiple processor architectures, *IEEE Trans. on Computers*, Vol. C-27, No. 11, November 1978, pp. 1059-1063.

18. G. G. L. Meyer and C. R. Westgate, editors, *Proceedings of the 1979 Conference on Information Sciences and Systems*, Baltimore, Maryland 1979.

19. G. G. L. Meyer, Asymptotic properties of sequences iteratively generated by point-to-set maps, *Mathematical Programming Studies, Point-to-Sets Maps and Mathematical Programming*, Vol. 10 (1979), pp. 115-127.

20. G. G. L. Meyer and R. C. Raup, On the structure of cluster point sets of iteratively generated sequences, *J. Optimization Theory and Applications*, Vol. 28, No. 3, July 1979, pp. 353-362.

21. G. G. L. Meyer, A fault diagnosis algorithm for asymmetric modular architectures, *IEEE Trans. on Computers*, Vol. C-30, No. 1, January 1981, pp. 81-83.

22. G. G. L. Meyer and W. J. Rugh, editors, *Proceedings of the 1981 Conference on Information Sciences and Systems*, Baltimore, Maryland 1981.

23. G. G. L. Meyer and A. J. David, Unstructured mean iterative processes in reflexive Banach spaces, *SIAM J. Control and Optimization*, Vol. 21, No. 1, January 1983, pp. 140-152.

24. G. G. L. Meyer, An efficient method of feasible directions, *SIAM J. Control and Optimization*, Vol. 21, No. 1, January 1983, pp. 153-162.

25. G. G. L. Meyer, A diagnosis algorithm for the BGM system level fault model, *IEEE Trans. Computers*, Vol. C-33, No. 8, August 1984, pp. 756-758.

26. G. G. L. Meyer and H. L. Weinert, Parallel algorithms and computational structures for linear estimation problems, in *Statistical Signal Processing*, E. J. Wegman and J. G. Smith, Ed., Marcel Dekker, Inc., New York, New York, 1984, pp. 507-516.

27. G. G. L. Meyer, Convergence properties of relaxation algorithms, *Mathematical Programming*, Vol. 31, No. 1, January 1985, pp. 15-24.

28. G. G. L. Meyer and M. J. O'Donnell, editors, *Proceedings of the 1985 Conference on Information Sciences and Systems*, Baltimore, Maryland, 1985.

29. G. G. L. Meyer and H. L. Weinert, On the design of fault-tolerant signal detectors, *IEEE Trans. Acoustics, Speech and Signal Processing*, Vol. ASSP-34, No. 4, August 1986, pp. 973-978.

30. G. G. L. Meyer and L. J. Podrazik, A parallel first-order linear recurrence solver, *J. Parallel and Distributed Computing*, Vol. 4, 1987, pp. 117-132.

31. G. G. L. Meyer, Convergence of relaxation algorithms by averaging, *Mathematical Programming, Series A*, Vol. 40, No. 2, February 1988, pp. 205-212.

32. G. G. L. Meyer and L. J. Podrazik, Parallel iterative algorithms for optimal control, *Parallel Processing for Scientific Computing*, G. Rodrigue Ed., SIAM Publications, Philadelphia, PA, 1989, pp. 250-254.

33. G. G. L. Meyer and M. A. Kennedy, The PMC system level fault model: cardinality properties of the implied faulty sets, *IEEE Trans. on Computers*, Vol. 38, No. 3, March 1989, pp. 478-480.

34. G. G. L. Meyer and H. L. Weinert, editors, *Proceedings of the 1989 Conference on Information Sciences and Systems*, Baltimore, Maryland, 1989.

35. G. G. L. Meyer and M. Pascale, A family of parallel QR factorization algorithms, *Special Issue of Concurrency, Practice and Experience*, Vol. 8 (6), July-August 1996, pp. 461-473.

36. G. G. L. Meyer and H. L. Weinert, *Editors, Proceedings of the 1997 Conference on Information Sciences and Systems*, Baltimore, Maryland March 19, 20 and 21, 1997.

37. J. J. Carrig and G. G. L. Meyer., Efficient Householder QR factorization for superscalar processors, *ACM Transactions on Mathematical Software*, Vol. 23, No. 3, September 1997, pp. 362-378.

38. J. J. Carrig and G. G. L. Meyer, A parameterized ordering for cache-, register-, and pipeline-efficient Givens QR decomposition, *Advances in Computational Mathematics*, Vol. 10, 1999, pp. 97-113.

39. G. G. L. Meyer and M. V. Pascale, Elliptic equations, *The Encyclopedia of Electrical and Electronics Engineering*, John Wiley and Sons, Inc., June 1999, Vol. 7, pp. 47- 54.

40. I. N. Dunn, G. G. L. Meyer, Parallel QR Factorization for Hybrid Message Passing/Shared memory Operation, *J. Franklin Institute*, Vol. 338, Issue 5, August 2001, pp. 601-613.

41. I. N. Dunn, G. G. L. Meyer, QR factorization for shared memory and message passing, *Parallel Computing*, Vol. 28, Issue 11, November 2002, pp. 1507-1530.

42. I. N. Dunn, G. G. L. Meyer, *A Parallel Algorithm Synthesis Procedure for High-Performance Computer Architectures*, Kluwer Publishing, 2003.

43. M. Ordowski, G. G. L. Meyer, Geometric Linear Discriminant Analysis for Pattern Recognition, *Pattern Recognition*, Vol. 37, No. 3, March 2004, pp. 421-428.

44. G. G. L. Meyer and H. L. Weinert, *Editors, Proceedings of the 2007 Conference on Information Sciences and Systems*, Baltimore, Maryland, March 14, 15 and 16, 2007.

Other Publications

1. G. G. L. Meyer and E. Polak, Abstract models for the synthesis of efficient optimization algorithms, *Proceedings of the Joint Automatic Control Conference,* June 24-26, 1970, Atlanta, Georgia, pp. 185-186.

2. G. G. L. Meyer, An open loop method of feasible directions for the solution of optimal control problems, *Proceedings of the of the Sixth Annual Princeton Conf. on Information Sciences and Systems,* March 23-24, 1972, Princeton, New Jersey, pp. 679-680.

3. G. G. L. Meyer, Characteristic set of a canonical structure, *Symposium on Nonlinear Programming, The George Washington University,* Washington, D.C., march 14-16, 1973.

4. G. G. L. Meyer, Necessary convergence conditions for a class of interior methods, *Proceedings of the Seventh Princeton Conference on Information Sciences and Systems,* March 22-23, 1973, Princeton, New Jersey, pp. 95-98.

5. G. G. L. Meyer, Inner loops in interior methods, *VIII International Symposium on Mathematical Programming, Stanford University, Stanford, California,* August 27-31, 1973.

6. G. G. L. Meyer, A segmented algorithm for solving a class of state constrained discrete optimal control problems, *Proceedings of the IEEE Decision and Control Conference,* December 5-7, 1973, San Diego, California, pp. 73-79.

7. G. G. L. Meyer, The removal of an uncontrollable inner loop from a specific iterative procedure, *Proceedings of the Eighth Annual Princeton Conference on Information Sciences and Systems,* March 28-29, 1974, Princeton, New Jersey, pp. 157-158.

8. G. G. L. Meyer, Accelerated Frank-Wolfe algorithms, *Proceedings Joint Automatic Control Conference,* June 19-21, 1974, Austin, Texas, pp. 656-661.

9. G. G. L. Meyer, Finite solvability of a family of approximating problems, *SIAM Fall Meeting,* Alexandria, Virginia, October 23-24, 1974.

10. G. G. L. Meyer, Transformations for finite memory algorithms, *Proceedings of the 1975 Conference on Information Sciences and Systems,* April 2-4, 1975, Baltimore, Maryland.

11. G. G. L. Meyer, Finite solvability of a family of approximating problems, *47th National ORSA /TIMS Meeting,* April 30-May 2, 1975, Chicago, Illinois.

12. G. G. L. Meyer, Fail resistant multiprocessing networks, *Proceedings of the Thirteenth Annual Allerton Conference on Circuit and System Theory,* October 1-3, 1975, Urbana, Illinois, pp. 93-102.

13. G. G. L. Meyer and G. Masson, An efficient fault diagnosis algorithm for multiple processor architecture, *Proceedings of the 1976 Conference on Information Sciences and Systems,* March 31, April 1-2, 1976, Baltimore, Maryland, pp. 249-251.

14. G. G. L. Meyer, A multi-microprocessor architecture for SOR-type algorithms, *Proceedings of the Fourteenth Annual Allerton Conference on Circuit and System Theory,* September 29-30, October 1, 1976, Urbana, Illinois, pp. 1102-1111.

15. G. G. L. Meyer, A finitely solvable class of approximating problems, *Proceedings of the 1976 IEEE Conference on Decision and Control,* December 1-3, 1976, Clearwater Beach, Florida, pp. 478-482.

16. G. G. L. Meyer and J. Biondi, A parallel Jacobi algorithm for solving the eigenproblem on a multi-microprocessor network, *Proceedings of the 1977 Conf. on Information Sciences and Systems,* March 30-31, April 1, 1977, Baltimore, Maryland, pp. 243-248.

17. G. G. L. Meyer, Fault diagnosis of modular networks with a small number of faults, *Proceedings of the Fifteenth Annual Allerton Conference on Communication, Control, and Computing,* September 28-30, 1977, Urbana, Illinois, pp. 727-731.

18. G. G. L. Meyer, Convergence conditions for a type of algorithm schema, *Proceedings of the 1977 IEEE Conference on Decision and Control,* December 7-9, 1977, New Orleans, Louisiana, pp. 400-402.

19. G. G. L. Meyer and R. C. Raup, Cluster point sets of iteratively generated sequences in *E sup n*, *Proceedings of the 1977 IEEE Conference on Decision and Control,* December 7-9, 1977, New Orleans, Louisiana, pp. 397-399.

20. G. G. L. Meyer and R. C. Raup, One dimensional mean value methods in iterations, *Proceedings of the 17th IEEE Conference on Decision and Control,* January 10-12, 1979, San Diego, California, pp. 907.

21. G. G. L. Meyer and A. J. David, A map independent one-dimensional averaging schema, *Proceedings of the 4th International Symposium on the Mathematical Theory of Networks and Systems,* July 3-6 1979, Delft, The Netherlands.

22. G. G. L. Meyer, An efficient method of feasible directions, *Tenth International Symposium on Mathematical Programming,* Montreal, August 27-31, 1979, Montreal, Canada.

23. G. G. L. Meyer, Fault diagnosis algorithms for asymmetric modular architectures, October 10-12, 1979, Urbana, Illinois, pp. 350-353.

24. G. G. L. Meyer and A. J. David, Robust iterative algorithms, *Proceedings of the Seventeenth Annual Allerton Conference on Communication, Control and Computing,* October 10-12, 1979, Urbana, Illinois, pp. 937-939.

25. G. G. L. Meyer and A. J. David, Input-output behavior of the one-dimensional mean iterative process, *Proceedings of the Fourteenth Annual Conference on Information Sciences and Systems,* March 26-28, 1980, Princeton, New Jersey.

26. G. G. L. Meyer, Synthesis of optimization algorithms by concatenation, *Proceedings of the Nineteenth IEEE Conference on Decision and Control,* December 10-12, 1980, Albuquerque, New Mexico.

27. G. G. L. Meyer, Transmission model for hybrid fault diagnosis, *Workshop on Analog Fault Diagnosis,* University of Notre Dame, South Bend, Indiana, May 26-27, 1981.

28. G. G. L. Meyer and B. L. Havlicsek, Morphic properties of deterministic and nondeterministic fault models, *Proceedings of the Nineteenth Annual Allerton Conference on Communication, Control and Computing,* Allerton House, Monticello, Illinois, September 30-October 2, 1981.

29. G. G. L. Meyer and A. J. David, Synthesis of a class of fixed point algorithms: the deterministic case, *Proceedings of the 20th IEEE Conference on Decision and Control,* December 16-18, 1981, San Diego, CA, pp. 349-350.

30. G. G. L. Meyer and B. L. Havlicsek, Totally morphic HM fault model, *Proceedings 16th Annual Conference on Information Sciences and Systems,* Princeton, New Jersey, March 17-19, 1982.

31. G. G. L. Meyer and H. L. Weinert, Computational structures for parallel linear regression, *Proceedings 16th Annual Conference on Information Sciences and Systems,* Princeton, New Jersey, March 17-19, 1982.

32. G. G. L. Meyer and H. L. Weinert, Parallel algorithms and computational structures for linear estimation problems, *1982 Office of Naval Research Workshop on Signal Processing in the Ocean Environment,* Annapolis, Maryland, May 11-14, 1982.

33. G. G. L. Meyer and M. A. Kennedy, A filtering approach to transient fault diagnosis, *Proceedings Twentieth Annual Allerton Conference on Communication, Control, and Computing,* Allerton House, Monticello, Illinois, October 6-8, 1982.

34. G. G. L. Meyer and B. L. Havlicsek, Diagnosability properties of weakly morphic HM fault models, *Proceedings 1982 IEEE International Large Scale Systems Symposium,* Virginia Beach, Virginia, October 11-13, 1982, pp. 314-315.

35. G. G. L. Meyer, Concatenation of deterministic and autonomous algorithm components, *Proceedings 1982 IEEE International Large Scale Systems Symposium,* Virginia Beach, Virginia, October 11-13, 1982, pp. 398-399.

36. G. G. L. Meyer and H. L. Weinert, An approach to reliable parallel data processing, *U. S.C. Workshop on VLSI and Modern Signal Processing,* University of Southern California, Los Angeles, California, November 1-3, 1982.

37. G. G. L. Meyer and A. J. David, Synthesis of a class of potential function algorithms, *Proceedings 21st IEEE Conference on Decision and Control,* Orlando, Florida, December 8-10, 1982.

38. G. G. L. Meyer and H. L. Weinert, Parallel algorithms and computational structures for linear estimation problems, *Proceedings 21st IEEE Conference on Decision and Control,* Orlando, Florida, December 8-10, 1982.

39. G. G. L. Meyer and B. L. Havlicsek, The development and application of system-level fault models, *Proceedings 1983 Automatic Test Program Generation Workshop,* San Francisco, California, March 15-16, 1983.

40. G. G. L. Meyer, The PMC system level fault model: maximality properties of the implied faulty sets, *Proceedings Seventeenth Annual Conference on Information Sciences and Systems,* Baltimore, Maryland, March 23-25, 1983.

41. G. G. L. Meyer and B. L. Havlicsek, A partial ordering for system-level fault models, *Proceedings Twenty-First Annual Allerton Conference on Communication, Control, and Computing,* Allerton House, Monticello, Illinois, October 5-7, 1983.

42. G. G. L. Meyer, A diagnosis algorithm for the BGM system level fault model, *Proceedings Twenty-First Annual Allerton Conference on Communication, Control, and Computing,* Allerton House, Monticello, Illinois, October 5-7, 1983.

43. G. G. L. Meyer and H. L. Weinert, Fault tolerant parallel implementations of the Kalman filter, *Proceedings Twenty-First Annual Allerton Conference on Communication, Control, and Computing,* Allerton House, Monticello, Illinois, October 5-7, 1983.

44. G. G. L. Meyer and H. L. Weinert, Strict and stochastic redundancy for fault tolerant computational networks, *SIAM Conference on Parallel Processing for Scientific Computing,* Norfolk, Virginia, November 10-11, 1983.

45. G. G. L. Meyer, Synthesis of optimization algorithms by concatenating deterministic and autonomous algorithm components, *Proceedings 22nd IEEE Conference on Decision and Control*, San Antonio, Texas, December 14-16, 1983.

46. G. G. L. Meyer and M. A. Kennedy, Structural diagnosability conditions for the PMC system level fault model, *Proceedings Eighteenth Annual Conference on Information Sciences and Systems,* Princeton University, Princeton, New Jersey, March 14-16, 1984.

47. G. G. L. Meyer and H. L. Weinert, Analysis of an error detection scheme for parallel computations, *Proceedings of the Eighteenth Annual Conference on Information Sciences and Systems,* Princeton University, Princeton, New Jersey, March 14-16, 1984.

48. G. G. L. Meyer, An anti-jamming procedure for relaxation algorithms, *Optimization Days 1984,* Montreal, Canada, May 2-4, 1984.

49. G. G. L. Meyer and M. A. Kennedy, Structured diagnosability conditions for the PMC system level fault model, *27th Midwest Symposium on Circuits and Systems,* Morgantown, West Virginia, June 11-12, 1984.

50. G. G. L. Meyer and H. L. Weinert, The effects of hardware faults on signal detector performance, *Proceedings of the 23rd IEEE Conference on Decision and Control,* Las Vegas, December 12-14, 1984.

51. G. G. L. Meyer, Convergence of algorithm combinations through averaging, *12th International Symposium on Mathematical Programming,* Massachusetts Institute of Technology, Cambridge, Massachusetts, August 5-9, 1985.

52. G. G. L. Meyer and L. J. Podrazik, A factorization approach to the parallel solution of linear recurrences, *Proceedings of the Twenty-Third Annual Allerton Conference on Communication, Control and Computing,* Allerton House, Monticello, Illinois, October 2-4, 1985.

53. G. G. L. Meyer and M. A. Kennedy, Diagnosis algorithms for structured PMC fault models, *Proceedings of the Twentieth Annual Princeton Conference on Information Sciences and Systems,* March 19-21, 1986, Princeton, New Jersey.

54. G. G. L. Meyer and L. J. Podrazik, A parameterized approach to the solution of linear recurrences, *Proceedings of the Twentieth Annual Princeton Conference on Information Sciences and Systems,* March 19-21, 1986, Princeton, New Jersey.

55. G. G. L. Meyer and L. J. Podrazik, A parameterization of the first-order optimality conditions for a class of discrete optimal control problems, *Proceedings Twenty-fourth Annual Allerton Conference on Communication, Control and Computing,* Allerton House, Monticello, Illinois, October 1-3, 1986.

56. G. G. L. Meyer and L. J. Podrazik, Parallel implementations of gradient based iterative algorithms for a class of discrete optimal control problems, *Proceedings 1987 International Conference on Parallel Processing,* St. Charles, Illinois, August 17-21, 1987.

57. G. G. L. Meyer and L. J. Podrazik, Parallel gradient projection algorithms to solve the discrete LQR optimal control problem with hard control bounds, *Proceedings Twenty-Fifth Annual Allerton Conference on Communication, Control and Computing,* Allerton House, Monticello, Illinois, September 30-October 2, 1987.

58. G. G. L. Meyer and L. J. Podrazik, Parallel iterative algorithms to solve the discrete LQR optimal control problem with hard control bounds, *Third SIAM Conference on Parallel Processing for Scientific Computing,* Los Angeles, California, December 1-4, 1987.

59. G. G. L. Meyer and V. K. Marianov, Algorithm synthesis and colinear scaling, *Proceedings Twenty-Second Annual Conf. on Information Sciences and Systems,* March 16-18, 1988, Princeton, New Jersey.

60. G. G. L. Meyer and L. J. Podrazik, A parallel Fletcher-Reeves gradient projection method, *Optimization Days 1988,* University of Montreal, May 2-4 1988, Montreal, Canada.

61. G. G. L. Meyer, Parallel computation of fixed points, *Proceedings Twenty-fourth Annual Princeton Conf. on Information Sciences and Systems,* March 21-23, 1990, Princeton, New Jersey.

62. G. G. L. Meyer and L. J. Podrazik, A Frank-Wolfe/gradient projection method for solving optimal control problems, *Proceedings Twenty-eighth Annual Allerton Conference on Communication, Control and Computing,* Allerton House, Monticello, Illinois, October 3-5, 1990, pp. 733-742.

63. G. G. L. Meyer and L. J. Podrazik, On the implementation and performance of parallel gradient projection algorithms for optimal control, *Second SIAM Conference on Linear Algebra,* November 5-8, 1990, San Francisco, California.

64. G. G. L. Meyer and L. J. Podrazik, A parallel Frank-Wolfe/gradient projection method for optimal control, *Proceedings IEEE Decision and Control Conference,* December 11-13, 1991, Brighton, Great Britain, pp. 1705-1710.

65. G. G. L. Meyer and L. J. Podrazik, An adaptive gradient projection method for large scale optimization, *Proceedings Twenty-sixth Annual Conference on Information Sciences and Systems,* March 18-20, 1992, Princeton, New Jersey, pp. 436-441.

66. G. G. L. Meyer and L. J. Podrazik, A parallel projected Fletcher-Reeves method for optimal control, *Proceedings 1992 American Control Conference,* June 24-26, 1992, Chicago, Illinois, pp. 147-151.

67. J. Carrig Jr., G. G. L. Meyer and L. J. Podrazik, Solving Optimal Control Problems on the C-90 and CM5 Supercomputers, *Third SIAM Conference on Linear Algebra, Signals, Systems, Control,* August 16-19, 1993, Seattle, Washington.

68. J. Carrig Jr. and G. G. L. Meyer, Designing linear recursion algorithms for parallel computers, *Proceedings of the Twenty-Eight Annual Conference on Information Sciences and Systems,* March 15-17, 1994, Princeton, New Jersey, pp. 588-593.

69. G.G. L. Meyer and L. J. Podrazik, Radial projection methods for finding stationary and critical points on the unit simplex, *Proceedings of the 1995 IASTED International Conference on Applied Modelling, Simulation and Optimization,* June 14-17, 1995, Cancun, Mexico, pp. 129-132.

70. G. G. L. Meyer and M. Pascale, A family of parallel QR factorization algorithms, *Proceedings of the High Performance Computing Symposium 95,* July 10-12, 1995, Montreal, Canada, pp. 95-106.

71. J. Carrig Jr. and G. G. L. Meyer, A Computational model for a class of synchronized distributed memory machines, *Proceedings of the 1995 International Conference on Parallel Processing,* August 14-18, 1995, Oconomowoc, Wisconsin, pp. I168-I172.

72. G. G. L. Meyer and M. Pascale, Parameterized parallel successive over-relaxation algorithms for linear arrays, *Proceedings of the 33rd Annual Allerton Conference on Communication, Control, and Computing,* October 4-6, 1995, Urbana, Illinois.

73. G. G. L. Meyer, M. Pascale, Parallel successive over-relaxation (SOR) algorithms, *Proceedings of the 1996 Conference on Information Science and Systems,* March 20-22, 1996, Princeton, New Jersey, pp. 1206-1211.

74. J. Carrig Jr., G. G. L. Meyer, A fast Givens QR algorithm for efficient cache utilization, *Proceedings of the 1996 Conference on Information Science and Systems,* March 20-22, 1996, Princeton, New Jersey, pp. 1216-1221.

75. J. J. Carrig Jr., G. G. L. Meyer, A three parameter fast Givens algorithm for superscalar processors, *Proceedings of the 1996 International Conference on Parallel Processing,* August 12-16, 1996, Bloomingdale, Illinois, Vol. II, pp. 11-18.

76. I. N. Dunn, J. J. Carrig Jr., G. G. L. Meyer, A parameterized matrix bidiagonal factorization algorithm, *Proceedings of the 1998 Conference on Information Science and Systems*, March 18, 19 and 20, 1998, Princeton, New Jersey, pp. 825-830.

77. I. N. Dunn, G. G. L. Meyer, Parallel fast Givens QR factorization on the HP/Convex Exemplar, *Proceedings of the 10th IASTED International Conference on Parallel and Distributed Computing and Systems,* October 28-31, 1998, Las Vegas, Nevada, pp. 590-595.

78. I. N. Dunn, G. G. L. Meyer, B. M. Hand, M. V. Pascale, A parallel algorithm synthesis procedure for embedded real-time digital signal processing systems, *Proceedings of the Spring 1999 Embedded Systems Conference,* March 1-4, 1999, Chicago, Illinois, Part 1: Paper 306, Part 2: Paper 316.

79. I. N. Dunn, G. G. L. Meyer, M. V. Pascale, Parallel triangular substitution for linear arrays, *Proceedings of the 9th SIAM Conference on Parallel Processing for Scientific Computing,* March 22-24, 1999, San Antonio, Texas.

80. I. N. Dunn, G. G. L. Meyer, Mercury RACE Multicomputer Performance for QR Factorization, *Proceedings of the Third Annual Workshop on High Performance Computing*, September 22-24, 1999, Boston, Massachusetts.

81. T. F. Steck, G. G. L. Meyer, P. G. Vouras, V. Gregers-Hansen, Advanced Radar Signal Processing on General-Purpose Commercial Multiprocessor Systems, *Proceedings of the Fourth Annual Workshop on High Performance Embedded Computing*, September 20-21, 2000, Boston, Massachusetts.

82. M. Ordowski, G. G. L. Meyer, Geometric Linear Discriminant Analysis, ICASSP 2001, Salt Lake City, Utah, May 7-11, 2001

83. T. Steck, G. G. L. Meyer, A New Data Distribution for Parallel LU Decomposition, *Proceedings of the Fith Annual Workshop on High Performance Embedded Computing*, November 25-27, 2001, Boston, Massachusetts.

84. T. Kamm, G. G. L. Meyer, Automatic Selection of Transcribed Training Material, *Automatic Speech Recognition and Understanding Workshop,* December 9-13, 2001, Madonna di Campiglio Trento, Italy.

85. M. Ordowski, G. G. L. Meyer, Geometric Linear Discriminant Analysis for Dimensionality Reduction, *Proceedings of the 2002 Conference on Information Science and Systems,* March 20-22, 2002, Princeton, New Jersey.

86. T. Steck, G. G. L. Meyer, Upper Diagonal Data Distribution for Matrix Factorization, *Proceedings of the 2002 Conference on Information Science and Systems*, March 20-22, 2002, Princeton, New Jersey.

87. T. Kamm, G. G. L. Meyer, Selective Sampling of Training Data for Speech Recognition, *Human Language Technology 2002*, March 24-27, San Diego, California

88. I. N. Dunn, G. G. L. Meyer, Parallel Compact WY QR Factorization for Asynchronous Message Passing, *Proceedings of the 21st IEEE International Performance, Computing, and Communications Conference*, April 3-5, 2002, Phoenix, Arizona.

89. T. F. Steck, P. G. Vouras, V. Gregers-Hansen, G. G. L. Meyer, A Comparison of Aegis Signal Processing Implementations on Multiprocessor Servers and Embedded Systems, *Tri-Service Radar Symposium*, June 24-27, 2002, Monterey, California.

90. P. Vouras, G. G. L. Meyer, Hybrid QR Factorization Algorithm for High Performance Computing Architectures, *Proceedings of the Sixth Annual Workshop on High Performance Embedded Computing*, September 24-26, 2002, Boston, Massachusetts.

91. T. Steck, G. G. L. Meyer, An Upper Diagonal Work Distribution for LU Decomposition on the HP SuperDome, *Proceedings of the 2003 International Conference on Communications in Computing (CIC 2003).* June 23 - 26, 2003, Las Vegas, Nevada, USA.

92. T. Kamm, G. G. L. Meyer, Word-Selective Training for Speech Recognition, *IEEE Automatic Speech Recognition and Understanding Workshop (ASRU) 2003*, November 30 – December 4, 2003, St. Thomas, U.S. Virgin Islands.

93. T. Kamm, G. G. L. Meyer, Robustness Aspects of Active Learning for Acoustic Modeling, *Interspeech 2004, 8th International Conference on Spoken Language Processing*, October 4-8, 2004, Jeju Island, Korea.

94. T.F. Steck, G.G.L. Meyer, A 7-step Approach to the Design and Implementation of Parallel Algorithms, *Proceedings of the 7th WSEAS International Conference on Applied Mathematics*, Cancun, MX May 11-14, 2005.

95. J.P. Stralka, G.G.L. Meyer, Constant Envelope Orthogonal Frequency-Division multiplexing Phase Modulation for Radar Pulse Compression, *Proceedings of the 2007 Conference on Information Science and Systems*, March 14-16, 2007, Baltimore , MD.

96. J. P. Stralka and G.G.L. Meyer, Constant Envelope OFDM Phase Modulation Radar System, Adaptive Array Processing Workshop (ASAP 2007), June 5-6, 2007, Massachusetts Institute of Technology, Lincoln Laboratory, Lexington, MA.

97. N. Borges, G. G. L. Meyer, and Teresa M. Kamm, Looking for Anomalies with a Speech Activity Detector, *COE Workshop on Stream Characterization from Content*, November 29, 2007, Johns Hopkins University Applied Physics Laboratory, Maryland.

98. N. Borges, G. G. L. Meyer, and Teresa M. Kamm, Unsupervised Distributional Anomaly Detection for a Self-Diagnostic Speech Activity Detector, *COE Quarterly Technical Review*, March 11, 2008, Johns Hopkins University Mt. Washington Conference Center, Maryland.

99. N. Borges and G. G. L. Meyer, Unsupervised Distributional Anomaly Detection for a Self-Diagnostic Speech Activity Detector, *Proceedings of the 2008 Conference on Information Science and Systems*, March 19-21, 2008, Princeton, New Jersey.

100. N. Borges, G. G. L. Meyer, and T. M. Kamm, Unsupervised Distributional Anomaly Detection for a Self-Diagnostic Speech Activity Detector, *Multimedia Research Exchange 2008*, May 13-16, 2008, Ottawa, Canada.

101. J. P. Stralka and G.G.L. Meyer, OFDM-Based Wideband Phased Array Radar Architecture, 2008 IEEE Radar Conference, May 26-30, 2008, Rome, Italy

102. N. Borges and G. G. L. Meyer, Coping with Training Contamination in Unsupervised Distributional Anomaly Detection, *Proceedings of the 2009 Conference on Information Science and Systems*, March 18-20, 2009, Baltimore, Maryland.

103. N. Borges and G.G.L. Meyer, Trimmed KL Divergence between Gaussian Mixtures for Robust Unsupervised Acoustic Anomaly Detection, *10th Annual Conference on the International Speech Communication Association, Interspeech 2009*, September 6-10, 2009, Brighton, UK

104. N. Borges, G.A. Coppersmith, G.G.L. Meyer, C.E. Priebe, Anomaly Detection for Random Graphs using Distributions of local Vertex Invariants, *Proceedings of the 2011 Conference on Information Science and Systems*, Baltimore MD, 2011

105. Justin Lloyd, G. G. L. Meyer, Optimal Stockpile Problems with Stochastic Consumption Saturation and Solution Interval, *Proceedings of the 2014 American Control Conference*, June 4-6 2014, Portland, OR

Sponsored Research

National Science Foundation, Engineering Initiation Grant: Implementation of a Class of Theoretical Iterative Procedures, 11/1/1972 - 10/31/1974: $16,000.

Office of Naval Research: Fault Tolerant Aspects of Large Scale Switching Networks (with G. M. Masson), 02/01/1976 - 09/30/1979: $ 67,560.

Office of Naval Research: Testability of Interconnection Structures, 06/01/1980 -09/30/1983: $115,185.

Office of Naval Research: Fault Tolerant Signal Processing Algorithms for Parallel Architectures (with H. L. Weinert), 09/01/1981 - 09/30/1984: $236,288.

Digital Equipment Corporation: Special Equipment Grant Program, VT103 kit, 04/1982: $58,340, GIGI 5-pack, 04/1982: $ 25,000.

Fairchild Communications and Electronics Co.: An Integrated Multi-Processor Approach to Digital Satellite Communication, 06/15/1984 - 12/31/1984: $ 25,000.

Air Force Office of Scientific Research: Fault-Tolerant Parallel Implementations of Iterative Algorithms for Optimal Control Problems (with H. L. Weinert),

- 01/01/1985-12/31/1985: $ 61,000.
- 01/01/1986-12/31/1986: $ 67,914.
- 01/01/1987-12/31/1987: $ 74,970.

Fairchild Communications and Electronics Co.: Digital Signal Processing for Satellite Voice Telecommunications, 01/01/1985 - 12/31/1985: $ 65,000.

Office of Naval Research: Oblique Projection Methods for Decentralized Statistical Signal Processing, (with H. L. Weinert), 05/01/1985 - 12/31/1987: $215,325.

Allied Corporation Foundation: Parallel Processing, Number: 05/01/1987 - 06/30/1988: $5,000.

IBM Technological Interchange Program: Artificial Intelligence and Imaging, (with S. Kasif and J. Goutsias),

- 05/01/1987 - 12/31/1987: $25,000.
- 03/03/1988-12/31/1988: $ 20,000.

National Science Foundation: Image Processing and Analysis Laboratory, Research Equipment Proposal, (with J. Goutsias, V. Solo, and H. L. Weinert), 03/15/1988 - 08/31/1989: $67,006.

Applied Physics Laboratory: Sonar Image Processing, Number: 01/01/1988 - 12/31/1988: $84,871.

Applied Physics Laboratory: Use of Symmetric Matched Filters for Detection in SPAN LOFAR Images, 05/01/1989 - 06/30/1990: $50,000.

Johns Hopkins University: Viking Project, 07/01/1989 - 06/30/1990: $1,000.

Applied Physics Laboratory: MSX Spacecraft Attitude Dynamics Modeling, Number: G46.7946, 10/15/1990 - 09/30/1991: $115,958.

Batelle Laboratory: Integrated Image Processing Environment, 03/14/1990 - 12/31/1990: $23,908.

Batelle Laboratory: Integrated Image Processing Environment, 04/05/1991 - 09/30/1991: $21,748.

Southeastern Center for Electrical Engineering Education: Advanced Tactical Data Link Evaluation Model Technical Support, 08/09/1991 - 12/15/1991: $ 26,702.

Applied Physics Laboratory: NOVA TM Data Base Conversion,

- 03/01/1991 - 03/31/1992: $146,478.
- 04/01/1992 - 09/30/1992: $81,868.

Applied Physics Laboratory: NOVA Power System Management, 10/01/1992 - 03/31/1993: $84,636.

Naval Research Laboratory: Scalable Search Code, 12/24/93 - 03/31/94: $4,980.

USRA: HRRE Hydrogen Recombination Radiation Experiment, 10/01/94-01/31/95: $ 19,342.

Batelle Laboratory: Kendall Square Research KSR1 Timing Models, 9/19/1994- 3/18/1995: $18,590.

Applied Physics Laboratory: Satellite Constellation Management,

- 04/01/1993 - 09/30/1993: $59,896.
- 10/1/1993 - 9/30/1994: $135,860.
- 11/1/1994 - 9/30/1995: $73,428.
- 10/01/1995 - 09/30/1996: $ 10,055.

Applied Physics Laboratory: Optimization of Control Software, 07/15/1995 - 09/30/1995: $19,999.

Westinghouse Electric Corporation Grant, 07/01/1995: $ 10,000.

APL/WSE Collaborative R & D Initiative: A Parallel Algorithm Design Methodology for Embedded Multi-Role Signal Processing, 09/01/1995 - 08/31/1996: $ 16,600.

Applied Physics Laboratory: Linear Algebraic Function Library Development, 02/01/1996 - 09/30/1996: $ 77,999.

Intel Corporation: Intel's P6 User Test Program Equipment Gift: $ 8700.

Applied Physics Laboratory: Software Development Guidelines, 10/01/1996 - 09/30/1997: $ 40,781

Applied Physics Laboratory: SVD for Linear Algebra Library, 10/01/1996 - 09/30/1997: $ 35,307

Lockheed Martin Corp.: Algorithms for Auditory Feature Reduction, (with A. Andreou) 03/13/97 - 12/31/97: $ 50,000

JHU Kenan Fund for Undergraduate Teaching, 07/01/97 - 05/01/98: $4,800

Applied Physics Laboratory: JHU/APL Integrated Electronics Module, Number: 10/01/1996 - 09/30/1998: $87,054

Intel Corporation: Scalable High Performance Computing Applications, Equipment Gift 06/27/1997 - 06/27/2000$: $ 52,684

Department of Defense: Vocal Tract Model and Adaptation Schemes, 10/01/98 - 09/30/99: $4,941

Naval Research Laboratory: MATLAB to C or FORTRAN Conversion, 07/28/99 - 09/30/99: $ 24,999

Naval Research Laboratory: High Performance Radar Signal Processing on Parallel Platforms 10/01/99 - 09/30/02: $359,998

MAITI Program: Development of a FPGA Design Laboratory, November 2000, $32,000

Applied Physics Laboratory: Parallel Signal Processing on Scientific/Embedded Computers, 05/01/01 – 10/31/01: $50,000

Applied Physics Laboratory Partnership Program: Digital Beam Forming Processing Technology,

- 01/01/02-12/31/02: $ 199,754 ($ 129,572 from Partnership)
- 01/01/03-12/31/03: $ 199,369 ($ 132,934 from Partnership)

Northrop Grumman – Johns Hopkins University Cooperative Effort: A Comparison of MPI Implementations on Beowulf Cluster, 06/01/03-12/31/03: $ 10,000

Northrop Grumman – Johns Hopkins University Cooperative Effort: Beowulf Network Structures for Signal Processing, Number: 04/01/04-10/30/04: $ 10,000

USARL Collaborative Technology Alliance (CTA) Advanced Beam Control Sub Task-1,

- On Campus Number: 12/01/03-12/31/04: $ 32,324,
- Off Campus: 12/01/03-12 /31/04: $ 77,676

Applied Physics Laboratory: Technology Development for Linear Optics Quantum Computing, 08/15/2004 – 01/31/2005: $ 26,730

Applied Physics Laboratory: Quantum Information, 02/01/2005 – 05/30/2006: $ 67,530

Applied Physics Laboratory: Digital Beam Forming Technology, 02/18/2005 – 09/30/2005: $ 51,246

Applied Physics Laboratory: Digital Radar Technology, 02/01/2007 – 09/14/2007: $49,929

Dockside Vision: Proposal Number: 07062295, 01/01/07-11/30/07: $23,904.

Applied Physics Laboratory: High Energy Propagation Models, 06/15/2007 – 08/31/2007: $11,987

Center of Excellence: Robust Alarmist Classifiers for Speech Processing Applications, 01/01/2008 – 12/31/2008: $94,500

Applied Physics Laboratory: Digital RADAR Hardware Modeling and Simulation, 05/06/2008 – 09/30/2008: $25,000

Center of Excellence: Robust Alarmist Classifiers for Speech Processing Applications, 01/01/2010 – 12/31/2010: $31,518

Applied Physics Laboratory: Algorithm Development, Geo-location Techniques, 06/03/2010-05/29/2011: $211,954.53

Center of Excellence: Robust Alarmist Classifiers for Speech Processing Applications, 01/01/2011 – 12/31/2011: $31,481.00

Applied Physics Laboratory: Geo-location Algorithm Development, 11/03/2011-09/30/2012: $202,708.00

Applied Physics Laboratory: Geo-location Algorithm Development, 07/22/2013-09/29/2013: $40,000.00

Applied Physics Laboratory: Geo-location Algorithm Development, 10/09/2013-06/30/2014: $202,701.00

Ph. D Dissertations

- Richard C. Raup: Iteratively Generated Sequences in Euclidean Space, May 1977.
- Alexander J. David: Synthesis of a Class of Fixed Point Algorithms, May 1981.
- Bruce L. Havlicsek: A New System-Level Approach to Diagnosability, May 1983.
- Mary Ann Kennedy: A Structural Approach to a System Level Fault Model, May 1987.
- Louis J. Podrazik: Parallel Implementations of Gradient Based Iterative Algorithms for Optimal Control Problems, May 1988.
- Michael V. Pascale: Parallel Algorithm Synthesis for Message-Passing Distributed-Memory Architectures, May 1997.
- James J. Carrig Jr.: Algorithm Design Methodologies for High Performance Computer Architectures, May 1997.
- Ian N. Dunn: A Parallel Algorithm Synthesis Procedure for High-Performance Computer Architectures, May 2001.
- Mark L. Ordowski: Geometric Linear Discriminant Analysis for Pattern Recognition Systems, May 2003.
- Teresa Kamm: Active Learning for Acoustic Speech Recognition Modeling, May 2004.
- Tom Steck: Design and Implementation of Parallel Algorithms for Matrix Factorization, May 2005
- John Stralka: Applications of Orthogonal Frequency-Division Multiplexing (OFDM) to RADAR, May 2008
- Nash Borges: Robust Anomaly Detection with Applications to Acoustics and Graphs, May 2014