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**Publications**

**Patents and Pending U.S. Patent Applications:**

1. U.S. Patent 6,522,875, "Geographical web browser, methods, apparatus and systems," February 18, 2003.
  2. U.S. Patent 6,522,688, "PCM codec and modem for 56K bi-directional transmission," February 18, 2003.
  3. U.S. Patent 6,487,654, "Virtual shadow registers and virtual register windows," November 26, 2002.
  4. U.S. Patent 6,370,640, "Virtual shadow registers and virtual register windows," April 9, 2002.
  5. U.S. Patent 6,363,475, "Apparatus and method for program level parallelism in a VLIW processor," March 26, 2002.
  6. U.S. Patent 6,282,638, "Virtual shadow registers and virtual register windows," August 28, 2001.
  7. U.S. Patent 6,226,738, "Split embedded-DRAM processor," May 2, 2001.
  8. U.S. Patent 6,170,051, "Apparatus and method for program level parallelism in a VLIW processor," January 2, 2001.
  9. U.S. Patent 6,163,863, "Processor with programmable addressing modes," December 19, 2000.
  10. U.S. Patent 6,157,988, "Method and apparatus for high performance branching in pipelined microsystems," December 5, 2000.
  11. U.S. Patent 6,128,728, "Virtual shadow registers and virtual register windows," October 3, 2000.
  12. U.S. Patent 6,026,478, "Split embedded-DRAM processor," February 15, 2000.
- Twenty-three pending U.S. patent applications, titles are not disclosed, seven allowed, pending issuance
  - Ten pending applications relate to Mobile Internet, telephony, Internet hardware/software
  - Six pending applications relate to CDMA wireless, smart antennas, and GPS based systems
  - Four pending applications relate to digital signal processing chip architectures
  - Three pending applications relate to signal processing for modems and DSL

**Refereed Journal Publications:**

1. U. Jani, E.M. Dowling, Z. Wang and R.M. Golden, "Multiuser Interference Suppression using the Block Shanno Constant Modulus Algorithm," IEEE Transactions on Signal Processing, pp. 1503-1506, Vol. 48, No. 5, May 2000.
2. Z. Wang, E.M. Dowling, and R.M. Golden, "A Block Stochastic Shanno Algorithm for Wireless Channel Equalization," IEEE Transactions on Signal Processing, in press.
3. Z. Fu and E.M. Dowling, "Conjugate Gradient Projection Subspace Tracking," IEEE Transactions on Signal Processing, May 1997.
4. R.D. DeGroat, E.M. Dowling, D.A. Linebarger, "Issues with Tracking Moving Targets via Subspace Tracking," Journal of VLSI Signal Processing, pp. 93-105, October, 1996.
5. Z. Fu, E.M. Dowling and R.D. DeGroat, "Systolic MIMD Architectures for 4-level spherical subspace tracking," Journal of Systems Architecture, pp. 171-193, Vol. 42, No. 3, October, 1996.
6. R.D. DeGroat, E.M. Dowling, H. Ye, and D.A. Linebarger, "Spherical Subspace Tracking for Efficient, High Performance Adaptive Signal Processing Applications," Signal Processing, pp. 101-121, Vol. 50, No. 2, April, 1996.

7. D.A. Linebarger, R.D. DeGroat, E.M. Dowling, P. Stoica and G. Fudge, "Incorporating A Priori Information into MUSIC --- Algorithms and Analysis," *Signal Processing*, pp. 85--104, vol. 46, no. 1, 1996.
8. E.M. Dowling, R.D. DeGroat, and D.A. Linebarger, L.L. Scharf and M. Vis, "Reduced Polynomial Order Linear Prediction," *IEEE Signal Processing Letters*, pp. 92--94, March, 1996.
9. V. Narayan, D.L. MacFarlane, and E.M. Dowling, "High Speed Discrete Time Optical Filtering," *Photonics Technology Letters*, pp. 1042--1044, September, 1995.
10. Z. Fu, E.M. Dowling and R.D. DeGroat, "Spherical Subspace Tracking on Systolic Arrays," *International Journal of High Speed Electronics and Systems*, Vol. 6, No.2, pp. 395--418, June 1995.
11. D.L. MacFarlane, E.M. Dowling and V. Narayan, "Ring Resonators with  $N \times M$  Couplers," *Journal of Fiber and Integrated Optics*, May 1995.
12. Z. Fu and E.M. Dowling, "Conjugate Gradient Eigenstructure Tracking for Adaptive Spectral Estimation," *IEEE Transactions on Signal Processing*, pp. 1151--1160, May 1995.
13. R.M. Roark, E.M. Dowling, R.D. DeGroat, B.C. Watson and S.D. Schaefer, "Time-Frequency Analyses of myoelectric thyroarytenoid Activity in Normal and Spasmodic Dysphonic Subjects," *Journal of Speech and Hearing Research*, Vol. 38, pp. 289--303, April 1995.
14. V. Narayan, D. L. MacFarlane, and E.M. Dowling "The Role of Imperfections in the operation of Optical Lattice Filters," *Optical Communications*, pp. 209--217, August 1994.
15. D.A. Linebarger, R.D. DeGroat, and E.M. Dowling, "Efficient Direction Finding Methods Employing Forward-Backward Averaging," *IEEE Transactions on Signal Processing*, pp. 2136--2145, August 1994.
16. V. Narayan, E. M. Dowling and D. L. MacFarlane, "Design of Multi-Stack Structures for High Frequency Bursts and Codes of Ultrashort Pulses," *IEEE Journal of Quantum Electronics*, pp. 1671--1680, July 1994.
17. E.M. Dowling, R.D. DeGroat and D.A. Linebarger, "Exponential Parameter Estimation in the Presence of Known Components and Noise," *IEEE Transactions on Antennas and Propagation*, pp. 590--599, May 1994.
18. E.M. Dowling, L.P. Ammann, and R.D. DeGroat, "A TQR-Iteration based Adaptive SVD for Real Time Angle and Frequency Tracking," *IEEE Transactions on Signal Processing*, pp. 914-926, April 1994.
19. E. M. Dowling and D. L. MacFarlane, "Lightwave Lattice Filters for Optically Multiplexed Communication Systems," *IEEE Journal of Lightwave Technology*, pp. 471-486, March 1994.
20. D. L. MacFarlane and E. M. Dowling, "Z-domain Techniques in the Analysis of Fabry-Perot Etalons and Multilayer Structures," *Journal of the Optical Society of America*, pp. 236-245, January 1994.
21. E. M. Dowling, Z. Fu and R.S. Drafz, "HARP: An Open Architecture for Matrix and Signal Processing," *IEEE Transactions on Parallel and Distributed Systems*, pp. 1081-1091, October 1993.
22. D. L. MacFarlane and E. M. Dowling, "Three Mirror Etalons as Bandpass Filters for Modulated Optical Signals," *IEEE Photonics Technology Letters*, pp. 1089-1092, September 1993.
23. R.D. DeGroat, E. M. Dowling and D.A. Linebarger, "The Constrained MUSIC Problem," *IEEE Transactions on Signal Processing*, pp. 1445-1449, March, 1993.
24. R.D. DeGroat and E. M. Dowling, "The Data Least Squares Problem and Channel Equalization," *IEEE Transactions on Signal Processing*, SP-41, No. 1, pp. 407-411, Jan., 1993.
25. E.M. Dowling, D.A. Linebarger, Y. Tong and M. Munoz, "An Adaptive Microphone Array Processing System," *Microprocessors and Microsystems*, Vol 16., No. 10, pp. 507-516, 1992.
26. A. Vaidyanathan, E.M. Dowling and P.T. Balsara, "Design and Implementation of a Multi-Microprocessor Architecture for Image Processing," *Microprocessors and Microsystems*, Vol. 16, No. 6, pp. 321-330, 1992.
27. E.M. Dowling and R.D. DeGroat, "Adaptation Dynamics of the Spherical Subspace Tracker," *IEEE Transactions on Signal Processing*, pp. 2599-2602, October 1992.
28. E.M. Dowling and R.D. DeGroat, "The Equivalence of the Total Least Squares and Minimum Norm Methods," *IEEE Transactions on Signal Processing*, pp. 1891--1892, August 1991.

#### **Chapters in Books:**

1. H. Chen, S. VanHuffel, E.M. Dowling, and R.D. DeGroat, "TLS Based Methods for Exponential Parameter Estimation," *Recent Advances in Total Least Squares Techniques and Errors-in-Variables Modeling*, S. VanHuffel Ed., Elsevier Publishing Co. 1997.
2. R.D. DeGroat, E.M. Dowling, and D.A. Linebarger, "Subspace Tracking," in *CRC Signal Processing Handbook*, pages 66-1 to 66-15, 1997.

3. E.M. Dowling, R.D. DeGroat, D.A. Linebarger and H. Ye, "Sphericalized SVD Updating for Subspace Tracking," in SVD and Signal Processing III, M. Moonen and B. De Moor, eds., Elsevier Publishing Company, pp. 227-234, 1995.
4. E.M. Dowling, R.D. DeGroat, D.A. Linebarger and Z. Fu, "Real Time Architectures for Spherical SVD Updating," in SVD and Signal Processing III, M. Moonen and B. De Moor, eds., Elsevier Publishing Company, pp. 235-242, 1995.
5. E. M. Dowling L.P. Ammann, and R.D. DeGroat, "A VLSI Algorithm for SVD Tracking," in VLSI Signal Processing V, K. Yao, R. Jain, W. Przytula, and J. Rabaey eds., IEEE Press, pp. 439-448, 1992.

#### **Other Technical Publications:**

1. D. Begusic, D. A. Linebarger, and E.M. Dowling, "Spectral line RLS adaptive filtering algorithm," IEEE ICASSP 1999.
2. H. Guan, R. DeGroat, E. Dowling and D. Linebarger, "Statistical Performance Analysis of the Reduced Rank and Polynomial Order Method", in Proceedings of the IEEE DSP Workshop, Aug. 1998.
3. H. Guan, R. DeGroat, E. Dowling and D. Linebarger, "Linearly Constrained Reduced Rank and Polynomial Order Methods", in Proceedings of the IEEE ICASSP, May 1998.
4. D. Linebarger, B. Raghothaman, D. Begusic, E. Dowling, R. DeGroat and S. Oh, "Low Rank Transform Domain Adaptive Filtering", Proc. of Asilomar Conf. on Signals, Systems, and Computers, Nov. 1997.
5. D.A. Linebarger, B. Raghothaman, R.D. DeGroat, E.M. Dowling, and Steven Oh, "Reduced rank transform domain adaptive filtering for high order echo cancellers and equalizers," Asilomar Conference, October 1997.
6. Z. Wang and E.M. Dowling, "Block Shanno constant modulus algorithms for wireless equalization," International Conference on Acoustics, Speech, and Signal Processing, April 1996.
7. H. Guan, R.D. DeGroat, E.M. Dowling, D.A. Linebarger and Louis Scarf, "New Results on Reduced Rank and Polynomial Order Method," 29th Asilomar Conference on Signals, Systems, and Computers, October 1996.
8. "Spherical Subspace and Eigen Based Affine Projection Algorithms", R.D. DeGroat, D. Begusic, E.M. Dowling and D.A. Linebarger, Proceedings of ICASSP 97, vol. 3, pp. 2345--2348, April 1997.
9. "New Results on Reduced Rank and Polynomial Order Methods", H. Guan, R.D. DeGroat, E.M. Dowling and D.A. Linebarger, Proc. of Asilomar Conf. on Signals, Systems, and Computers, Nov. 1996.
10. Z. Wang and E.M. Dowling, "Stochastic conjugate gradient constant modulus blind equalizer for wireless communications," pp. 832-836, International Conference on Communications, June 1996.
11. E. Marti-Panameno, H. Ramirez, D. L. MacFarlane, E. M. Dowling, G. Lugo-Martinez, G. E. Torres-Cisneros, "Mode-locking in a ring fiber laser caused by the diameter stretching of the core fiber," 1996 Annual Meeting of the Optical Society of America, Rochester, NY, October 20-24, 1996.
12. E.M. Dowling and J. Turi, "On Some Practical Aspects of Single Sensor Active Noise Control" in Proceedings of the Conference on Decision and Control, November, 1995.
13. E.M. Dowling, D.A. Linebarger and R.D. DeGroat, "On the Elimination of Extraneous Roots," 29th Asilomar Conference on Signals, Systems, and Computers, October 1995.
14. E.M. Dowling, R.D. DeGroat, D.A. Linebarger, "Efficient, High Performance Subspace based Tracking Problems" in Advanced Signal Processing Algorithms, Architectures and Applications VI, SPIE, pp. 253-264.
15. D.A. Linebarger, R.D. DeGroat, E.M. Dowling, G. Fudge and P. Stoica, "Analyzing the effects of constraints and inter-signal coherence on the MUSIC algorithm," International Conference on Acoustics, Speech, and Signal Processing, pp. 1657-1660, May 1995.
16. Z. Fu and E.M. Dowling, "Conjugate Gradient Projection Subspace Tracking," 28th Asilomar Conference on Signals, Systems, and Computers, October 1994.
17. V. Narayan, E.M. Dowling and D.L. MacFarlane, "Digital Signal Filtering with Femtosecond Pulses," Optical Society of America Annual Meeting, pp. WCC3, Dallas Texas, October, 1994.
18. R. Pawate and E. M. Dowling, "A New Method for Segmenting Continuous Speech," IEEE International Conference on Acoustics, Speech, and Signal Processing, 1994, I53-56.
19. D.A. Linebarger, R.D. DeGroat, and E.M. Dowling, "Computational Reductions Exploiting Structure in Forward/Backward Data," IEEE Statistical Signal Processing Workshop, pp. 397--400, August 1994.
20. R.M. Roark, E.M. Dowling, R.D. DeGroat, B.C. Watson and S.D. Schaefer, "Spectral myoelectric analysis of thyroarytenoid activity in normal and spasmodic dysphonic subjects," 126th meeting of the Acoustical Society of America, Oct. 1993.

21. Z. Fu, E.M. Dowling and R.D. DeGroat, "Systolic Arrays for Spherical Subspace Tracking," 27th Asilomar Conference on Signals, Systems, and Computers, pp. 766-770, Nov 1993.
22. R.D. DeGroat, H. Ye, and E.M. Dowling, "An Asymptotic Analysis of Spherical Subspace Updating," 27th Asilomar Conference on Signals, Systems, and Computers, pp. 344-348, Nov 1993.
23. D. L. MacFarlane and E.M. Dowling, "Z-domain techniques in the analysis and design of Fabry Perot etalons and multilayer structures", OSA Annual Meeting and Interdisciplinary Laser Science Conference, pp. TuZ5 Toronto Canada, October, 1993.
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25. E.M. Dowling and R.D. DeGroat, "A Spherical Subspace Based Adaptive Filter," IEEE International Conference on Acoustics, Speech, and Signal Processing, pp. III-504-507, April, 1993.
26. D.A. Linebarger, R.D. DeGroat, E. M. Dowling and P. Stoica, "Constrained Beamspace MUSIC," IEEE International Conference on Acoustics, Speech, and Signal Processing, pp. IV-548-551, April, 1993.
27. E.M. Dowling, D.A. Linebarger and R.D. DeGroat, "Reduced Order SFTF-RLS Adaptive Echo Cancellers," UT-D DSP Tech Report, August, 1993.
28. E.M. Dowling, R.D. DeGroat, D.A. Linebarger, J.A. Wilson and M.S. Andrews, "Implementation of a Multi-Sproc T1 Echo Cancellation System," Application Note, Star Semiconductor Inc., 1993.
29. D.A. Linebarger, E.M. Dowling and R.D. DeGroat, "Adaptive Echo Cancellers for Digital Telephony and Wireless Systems," UT-D DSP Tech Report, August, 1992.
30. R.D. DeGroat and E.M. Dowling, "Spherical Subspace Tracking: Algorithm, Analysis, and Detection Schemes," the Twenty-sixth Asilomar Conference on Signals, Systems, and Computers, (Invited Paper), pp. 561--565, October, 1992.
31. E. M. Dowling L.P. Ammann, and R.D. DeGroat, "An Adaptive TQR-SVD for Angle and Frequency Tracking," the Twenty-sixth Asilomar Conference on Signals, Systems, and Computers, (Invited Paper), pp. 565-570, October, 1992.
32. R. Pawate and E. M. Dowling, "A Hidden Markov Modeling Approach to Speech Enrollment," the Twenty-sixth Asilomar Conference on Signals, Systems, and Computers, pp. 1105-1110, October, 1992.
33. E. M. Dowling, R.D. DeGroat and D.A. Linebarger, "Total Least Squares with Linear Constraints," IEEE International Conference on Acoustics, Speech, and Signal Processing, pp. V341-V344, March, 1992.
34. E.M. Dowling, Z. Fu and R.S. Drafz, "Parallel Signal and Matrix Processing with the TMS34082," TMS34082 Designer's Handbook, Texas Instruments, Inc., pp. F1- F20, 1991.
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36. E.M. Dowling and R.D. DeGroat, "Recursive Total Least Squares Adaptive Filtering," SPIE Adaptive Signal Processing, pp. 35-46, August, 1991.
37. R.D. DeGroat and E.M. Dowling, "Non-Iterative Subspace Updating," SPIE Advanced Signal Processing Algorithms, Architectures, and Implementations pp. 376--387, August, 1991.
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41. E. M. Dowling and F. J. Taylor, "Matrix Methods for the Design and Analysis of Recurrent Algorithms for Multi-Purpose Systolic Arrays," IEEE International Conference on Acoustics, Speech, and Signal Processing, pp. 2409-2412, May, 1989.
42. E.M. Dowling, "Systolic and Bus Connected Arrays --- Architectures, Algorithms, and Algorithm Transformations," Ph.D. dissertation, University of Florida, May, 1989.

43. R. Drafz, K. Smith, E. Dowling, M. Griffin, M. Lynch and F. Taylor, "A Low-Cost PC/AT Microcomputer Turns into a Supercomputer with Floating Point ICs Designed to Process Data in Parallel," *Electronic Design Magazine*, pp. 89-93, November. 1988.
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**Commercial/Educational Software:**

1. F.J. Taylor, E.M. Dowling and G. Logothetis, "Monarch Signal Processing Software," The Athena Group Inc., (Royalties Agreement) 1989.
2. E.M. Dowling, "TMS320C25 Code Generator Module, Monarch Signal Processing Software," The Athena Group Inc., (Royalties Agreement) 1989.