

Lars Eldén
Department of Mathematics
Linköping University

December 16, 2011

Scientific Publications

Papers in scientific journals

1. L. Eldén and B. Savas. Perturbation theory and optimality conditions for the best multilinear rank approximation of a tensor. *SIAM J. Matrix Anal. Appl.*, 32:1422–1450, 2011.
2. Lars Eldén, M. Kilmer, and D. O’Leary. *Selected Works of G. W. Stewart with Commentaries*, chapter Updating and Datedating Matrix Decompositions, pages 45–58. Birkhäuser, Boston, 2010.
3. Xiao-Li Feng, Lars Eldén, and Chu-Li Fu. A quasi-boundary-value method for the Cauchy problem for elliptic equations with nonhomogeneous Neumann data. *J. Inv. Ill-Posed Problems*, 18:617645, 2010.
4. Xiao-Li Feng, Lars Eldén, and Chu-Li Fu. Stability and regularization of a backward parabolic PDE with variable coefficients. *J. Inverse and Ill-Posed Problems*, 18:217–243, 2010.
5. L. Simonsson and L. Eldén. Grassmann algorithms for low rank approximation of matrices with missing values. *BIT Numerical Mathematics*, 50:173–191, 2010.
6. M. Rezhghi and L. Eldén. Diagonalization of tensors with circulant structure. *Lin. Alg. Appl.*, 435:422447, 2011.
7. L. Eldén and B. Savas. A Newton–Grassmann method for computing the best multi-linear rank- (r_1, r_2, r_3) approximation of a tensor. *SIAM J. Matrix Anal. Appl.*, 31:248–271, 2009.
8. L. Eldén and V. Simoncini. Numerical solution of a Cauchy problem for an elliptic equation by Krylov subspaces. *Inverse Probl.*, 25(6):065002, 2009.
9. R. Bro and L. Eldén. PLS works. *J. Chemometrics*, 23:69–71, 2008.
10. B. Savas and L. Eldén. Handwritten digit classification using higher order singular value decomposition. *Pattern Recognition*, 40:993–1003, 2007.

11. L. Eldén. Numerical linear algebra in data mining. *Acta Numerica*, 15:327–384, 2006.
12. Z. Ranjbar and L. Eldén. Numerical analysis of an ill-posed Cauchy problem for a convection-diffusion equation. *Inverse Problems in Science and Engineering*, 15(3):191–211, 2007.
13. L. Eldén, P.C. Hansen, and M. Rojas. Computing functionals defined on solutions of large-scale discrete ill-posed problems. *BIT*, 45:329 – 340, 2005.
14. L. Eldén and F. Berntsson. A stability estimate for a Cauchy problem for an elliptic partial differential equation. *Inverse Problems*, 21:1643–1653, 2005.
15. L. Eldén and B. Savas. The maximum likelihood estimate in reduced-rank regression. *Numerical Linear Algebra*, 12:731–741, 2005.
16. H. Park and L. Eldén. Matrix rank reduction for data analysis and feature extraction. In E.J. Kontoghiorghes, editor, *Handbook of parallel computing and statistics*. CRC Press, Boca Raton, 2005.
17. L. Eldén. Partial least squares vs. Lanczos bidiagonalization I: Analysis of a projection method for multiple regression. *Comput. Statist. Data Anal.*, 46:11–31, 2004.
18. E. Lundström and L. Eldén. Adaptive eigenvalue computations using Newton’s method on the Grassmann manifold. *SIAM J. Matrix Anal. Appl.*, 23:819–839, 2002.
19. Lars Eldén. Solving quadratically constrained least squares problems using a differential-geometric approach. *BIT*, 42:323 – 335, 2002.
20. Myungwon Kim, H. Park, and L. Eldén. Comparison of algorithms for Toeplitz least squares and symmetric positive definite linear systems. *Contemporary Mathematics*, 281:73–99, 2001.
21. V. Simoncini and L. Eldén. Inexact Rayleigh quotient-type methods for eigenvalue computations. *BIT*, 42:159–182, 2002.
22. F. Berntsson and Lars Eldén. Numerical solution of a Cauchy problem for the Laplace equation. *Inverse Problems*, 17:839–854, 2001.
23. T. Regińska and L. Eldén. Stability and convergence of a wavelet-Galerkin method for the sideways heat equation. *J. Inverse Ill-Posed Problems*, 8:31–49, 2000.
24. H. Park and L. Eldén. Schur-type methods for solving least squares problems with Toeplitz structure. *SIAM J. Scient. Comput*, 22:406–430, 2000.

25. L. Eldén, F. Berntsson, and T. Regińska. Wavelet and Fourier methods for solving the sideways heat equation. *SIAM J. Sci. Comput.*, 21(6):2187–2205, 2000.
26. L. Eldén and H. Park. A Procrustes problem on the Stiefel manifold. *Numer. Math.*, 82:599–619, 1999.
27. A. Dax and L. Eldén. Approximating minimum norm solutions of rank-deficient least squares problems. *Numerical Linear Algebra Appl.*, 5:79–99, 1998.
28. H. Park and L. Eldén. Stability analysis and fast algorithms for triangularization of Toeplitz matrices. *Numer. Math.*, 76:383–402, 1997.
29. P. Lamm and L. Eldén. Numerical solution of first-kind Volterra equations by sequential Tikhonov regularization. *SIAM J. Numer. Anal.*, 34:1432–1450, 1997.
30. T. Regińska and L. Eldén. Solving the sideways heat equation by a wavelet-Galerkin method. *Inverse Problems*, 13:1093–1106, 1997.
31. L. Eldén and E. Sjöström. Fast computation of the principal singular vectors of Toeplitz matrices arising in exponential data modelling. *Signal Processing*, 50:151–164, 1996.
32. L. Eldén and H. Park. Perturbation and error analyses for block downdating of a Cholesky decomposition. *BIT*, 36:239–255, 1996.
33. L. Eldén. Solving the sideways heat equation by a 'method of lines'. *J. Heat Transfer, Trans. ASME*, 119:406–412, 1997.
34. L. Eldén. Numerical solution of the sideways heat equation by difference approximation in time. *Inverse Problems*, 11:913–923, 1995.
35. H. Park and L. Eldén. Downdating the rank-revealing URV decomposition. *SIAM J. Matrix Anal. Appl.*, 16:138–155, 1995.
36. L. Eldén and H. Park. Block downdating of least squares solutions. *SIAM J. Matrix Anal. Appl.*, 15:1018–1034, 1994.
37. A. Björck, H. Park, and L. Eldén. Accurate downdating of least squares solutions. *SIAM J. Matrix Anal. Appl.*, 15:549–568, 1994.
38. L. Eldén and H. Park. Perturbation analysis for block downdating of a Cholesky decomposition. *Numerische Mathematik*, 68:457–467, 1994.
39. T. Seidman and L. Eldén. An optimal filtering method for the sideways heat equation. *Inverse Probl.*, 6:681–696, 1990.

40. L. Eldén. Algorithms for the computation of functionals defined on the solution of a discrete ill-posed problem. *BIT*, 30:466–483, 1990.
41. L. Eldén. Hyperbolic approximations for a Cauchy problem for the heat equation. *Inverse Problems*, 4:59–70, 1988.
42. L. Eldén. Approximations for a Cauchy problem for the heat equation. *Inverse Problems*, 3:263–273, 1987.
43. L. Eldén and R. Schreiber. A systolic array for the regularization of ill-conditioned least squares problems with triangular Toeplitz matrix. *Lin. Alg. Appl.*, 77:137–147, 1986.
44. L. Eldén and R. Schreiber. An application of systolic arrays to linear, discrete ill-posed problems. *SIAM J. Sci. Stat. Comput.*, 7:892–903, 1986.
45. L. Eldén. A note on the computation of the generalized cross-validation function for ill-conditioned least squares problems. *BIT*, 24:467–472, 1984.
46. L. Eldén. An efficient algorithm for the regularization of ill-conditioned least squares problems with triangular Toeplitz matrix. *SIAM J. Sci. Stat. Comput.*, 5:229–236, 1984.
47. L. Eldén. An algorithm for the regularization of ill-conditioned, banded least squares problems. *SIAM J. Sci. Stat. Comput.*, 5:237–254, 1984.
48. L. Eldén. Time discretization of the backward solution of parabolic equations, part II. *Math. Comp.*, 39:69–84, 1982.
49. L. Eldén. Time discretization of the backward solution of parabolic equations, part I. *Math. Comp.*, 39:53–68, 1982.
50. L. Eldén. A weighted pseudoinverse, generalized singular values, and constrained least squares problems. *BIT*, 22:487–502, 1982.
51. L. Eldén. Perturbation theory for the least squares problem with linear equality constraints. *SIAM J. Numer. Anal.*, 17:338–350, 1980.
52. L. Eldén. Algorithms for the regularization of ill-conditioned least squares problems. *BIT*, 17:134–145, 1977.

Books

1. Lars Eldén. *Matrix Methods in Data Mining and Pattern Recognition*. Society for Industrial and Applied Mathematics, Philadelphia, PA, Philadelphia, PA, USA, 2007.

2. L. Eldén, L. Wittmeyer-Koch, and H. Bruun Nielsen. *Introduction to Numerical Computation – Analysis and MATLAB Illustrations*. Studentlitteratur, Lund, 2004.
3. L. Eldén and L. Wittmeyer-Koch. *Numeriska beräkningar - analys och illustrationer med Matlab*. Studentlitteratur, Lund, 2001.
4. L. Eldén and L. Wittmeyer-Koch. *Numerisk Analys – en introduktion*. Studentlitteratur, Lund, 1987.
5. L. Eldén and L. Wittmeyer-Koch. *Numerical Analysis: an Introduction*. Academic Press, 1990.
6. H. Park and L. Eldén. *Numerical Linear Algebra Algorithms on Vector and Parallel Computers*. Number 15 in Lecture Notes Series. Seoul National University, Research Institute of Mathematics, 1993.

PhD Thesis

L. Eldén. *Numerical analysis of regularization and constrained least squares methods*. Linköping studies in science and technology, no. 21, Department of Mathematics, Linköping University, 1978.

Papers in Conference Proceedings

1. H. Kim, H. Park, and L. Eldén. Non-negative tensor factorization based on alternating large-scale non-negativity-constrained least squares. In *Proceedings of the 7th IEEE International Conference on Bioinformatics & Bioengineering (IEEE BIBE 2007)*, volume II, page 11471151, 2007.
2. F. Berntsson and Lars Eldén. Numerical solution of an inverse steady state heat conduction problem. In *Inverse Problems in Engineering Mechanics. International Symposium on Inverse Problems in Engineering Mechanics 2000 (ISIP 2000)*, Nagano, Japan. Elsevier, 2000.
3. L. Eldén and F. Berntsson. Spectral and wavelet methods for solving an inverse heat conduction problem. In *International Symposium on Inverse Problems in Engineering Mechanics*, Nagano, Japan, 1998.
4. F. Berntsson, L. Eldén, R. Garcia-Padron, and D. Loyd. A comparison of three numerical methods for an inverse heat conduction problem and an industrial application. In R. W. Lewis, editor, *Proceedings of the 10th International Conference on Numerical Methods in Thermal Problems*, Swansea, 1997.

5. M. Clark, P. Stoica, and L. Eldén. A computationally efficient implementation of 2-d iqml. In *Proc. 31st Asilomar Conf. on Signals, Systems and Computers*, Asilomar, 1997.
6. L. Eldén. Numerical solution of the sideways heat equation. In H. Engl and W. Rundell, editors, *Inverse Problems in Diffusion Processes*, pages 130–150. SIAM, Philadelphia, 1995.
7. H. Park, S. Van Huffel, and L. Eldén. Fast algorithms for exponential data modeling. In *IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, volume 4, pages 25–28. IEEE, New York, 1994.
8. H. Park and L. Eldén. Fast and accurate Toeplitz matrix triangularization for linear prediction. In L. Eggermont, P. DeWilde, E. Deprettere, and J. van Meerbergen, editors, *VLSI Signal Processing VI*, New York, 1993. IEEE.
9. L. Eldén. Datedating QR decompositions. In J.G. McWhirter, editor, *Mathematics in Signal Processing II*, pages 561–574. Clarendon Press, Oxford, 1990.
10. L. Eldén. Modified equations for approximating the solution of a Cauchy problem for the heat equation. In C.W. Groetsch H.W. Engl, editor, *Inverse and Ill-posed Problems*, pages 345–350, Orlando, Florida, 1987. Academic Press.
11. L. Eldén. The numerical solution of a non-characteristic Cauchy problem for a parabolic equation. In P. Deuffhard and E. Hairer, editors, *Numerical Treatment of Inverse Problems in Differential and Integral Equations, Proceedings of an International Workshop, Heidelberg, 1982*, pages 246–268. Birkhäuser, Boston, 1983.
12. L. Eldén. Regularization of the backward solution of parabolic problems. In G. Anger, editor, *Inverse and improperly posed problems in differential equations*, Berlin, 1979. Akademie-Verlag.

Technical Reports

1. B. Savas and L. L. Eldén. Krylov subspace methods for tensor computations. Technical report, Department of Mathematics, Linköping University, 2009. Available at <http://www.mai.liu.se/~laeld/>.
2. M. Rezghi and L. Eldén. Diagonalization of circulant tensors with application in image deblurring. Technical Report LiTH-R-MAT-2008-10, Department of Mathematics, Linköping University, 2008.
3. L. Eldén and B. Savas. A Newton–Grassmann method for computing the best multi-linear rank- (r_1, r_2, r_3) approximation of a tensor. Technical Report LiTH-R-MAT-R-2007-6-SE, Department of Mathematics, Linköping University, 2007. To appear in *SIAM J. Matrix Anal. Appl.*

4. Lars Eldén. A note on the eigenvalues of the Google matrix. Technical Report LiTH-MAT-R-04-01, Department of Mathematics, Linköping University, 2004.
5. Lars Eldén and Valeria Simoncini. Inexact Rayleigh quotient-type methods for subspace tracking. Technical Report IAN-CNR Tech.Rep. 1172, Istituto di Analisi Numerica - CNR, Pavia, 1999.
6. H. Park and L. Eldén. Fast solutions for least squares problems with Toeplitz structure. Technical Report LiTH-MAT-R-96-08, Department of Mathematics, Linköping University, 1996.
7. H. Park and L. Eldén. Fast and accurate Toeplitz matrix triangularization. Technical Report Preprint 93-038, University of Minnesota, AHPCRC, April 1993.
8. B. Hallinger and L. Eldén. Supercomputer implementation of block downdating algorithms. Technical Report LiTH-MAT-R-1994-10, Department of Mathematics, Linköping University, 1994.
9. L. Eldén and G. Svensson. Matrix computations on an SIMD parallel computer. Technical Report LiTH-MAT-R-1990-19, Department of Mathematics, Linköping University, 1990.
10. L. Eldén. A parallel QR decomposition algorithm. Technical Report LiTH-MAT-R-1988-02, Department of Mathematics, Linköping University, 1988.
11. L. Eldén and I. Skoglund. Algorithms for the regularization of ill-conditioned least squares problems with tensor product structure, and application to space-variant image restoration. Technical Report LiTH-MAT-R-1982-48, Department of Mathematics, Linköping University, 1982.
12. L. Eldén and I. Skoglund. A practical examination of four methods for space-invariant image restoration. Technical Report LiTH-MAT-R-1981-24, Department of Mathematics, Linköping University, 1981.
13. L. Eldén. A program for interactive regularization, part I: Numerical algorithms. Technical Report LiTH-MAT-R-1979-25, Department of Mathematics, Linköping University, 1979.
14. A. Björck and L. Eldén. Methods in numerical algebra for ill-posed problems. Technical Report LiTH-MAT-R-79-33, Department of Mathematics, Linköping University, 1979.
15. L. Eldén. Algorithms for the least squares problem with banded inequality constraints. Technical Report LiTH-MAT-R-1977-20, Department of Mathematics, Linköping University, 1977.

16. L. Eldén. A note on weighted pseudoinverses with application to the regularization of Fredholm integral equations of the first kind. Technical report, Department of Mathematics, Linköping University, 1975.
17. L. Eldén. Numerical methods for the regularization of Fredholm integral equations of the first kind. Technical Report LiTH-MAT-R-1974-7, Department of Mathematics, Linköping University, 1974.
18. L. Eldén. Stepwise regression analysis with orthogonal transformations. Technical Report LiTH-MAT-R-1972-2, Department of Mathematics, Linköping University, 1972.