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CURRICULUM VITÆ

Åke Björck

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RESEARCH INTERESTS

Numerical Analysis and Scientific Computing, and in particular
—Least squares problems
—Direct and iterative methods for ill-posed problems
—Structures problems in linear algebra
—Computation methods in Statistics
—Direct methods for sparse linear algebra problems

EDUCATION

1968 Ph. D. (Tekn.dr.), Docent, Department of Computer Sciences,
Royal Institute of Technology, Stockholm
1964 Tekn.lic., Department of Computer Sciences, Royal Institute
of Technology, Stockholm

EMPLOYMENT

Professor emeritus, Department of Mathematics, Linköping University, 2000–present
Professor Department of Mathematics, Linköping University, 1969–2000
Lecturer, Royal Institute of Technology, Stockholm 1964–1968

OFFICES HELD

Member of the Board of Directors, National Supercomputer Centre
in Sweden, 1988–1997
President SIAM Nordic Section, 1987–1990
Dean, Faculty of Technology, Linköping University, 1971–73.

INDUSTRIAL EXPERIENCES

Member of the Board of Directors, Swedish Institute of Applied Mathematics,
1980–1988.
Distinguished scientific consultant, Chr. Michelsen Institute, Bergen, Norway,
Nov.–Dec. 1985
Visiting professor AERE Harwell, England, July–August 1979.

PRINCIPAL ACADEMIC VISITS

Visiting professor, Stanford University, Stanford, CA, Dec. 2000
Visiting professor, IAMA, University of Minnesota, MN, Sept.–Dec. 1991
Visiting professor, Beijing, Nanjing and Fudan Universities, P.R. China, Oct. 1989
Visiting professor, Oak Ridge & University of Tennessee, Knoxville, TN Jan.–Feb. 1988
Visiting professor, USC, Los Angeles, CA, spring 1987
Visiting professor, CERN, Geneve, Switzerland, March 1981
Visiting professor, CSIRO and ANU, Canberra, Jan.–March 1985
Visiting professor, Stanford University, Stanford, CA, Jan.–June 1979
Visiting professor, Academy of Sciences, Prag, Sept. 1976
Visiting professor, Stanford University Stanford, CA, Jan.–June 1974
Visiting professor, University of California, Berkeley, CA, Jan.–June 1969
Visiting professor, Stanford University, Stanford, CA, Sept.–Dec. 1968
Visiting scholar, Four French universities, May 1963

EDITORIAL ACTIVITIES

BIT Numerical Mathematics, Area Editor, 1979–1992, Managing Editor, 1992–2002
Numerical Linear Algebra with Applications, Advisory Editor, 1994–1999,
Editor 1999–2008
Numerical Algorithms, Editor 1990–1995
Annals of the Inst. of Statistical Mathematics, Tokyo, Editor 1988–2002
SIAM Journal on Scientific and Statistical Computing, Editor 1982–1992
SIAM Journal on Applied Mathematics, Editor 1974–1975
Computational Statistics Quarterly, Editor 1982–1988
ACM Transaction on Mathematical Software, Editor 1975–1982
Journal of Computational and Applied Mathematics, Editor 1974–1980

MEMBERSHIPS IN PROFESSIONAL SOCIETIES

Society of Industrial and Applied Mathematics
Association for Computing Machinery
Swedish Mathematical Society

OTHER PROFESSIONAL ACTIVITIES

Chairman organizing committee, BIT 40th Anniversary Meeting, Lund, Sweden,
August 2000.
Member program committee, Householder Symposium XV, Whistler, BC, Canada,
June 1999.
Member organizing committee, Sixth SIAM Conference on Applied Linear
Snowbird, Utah, Nov. 1997

Member program committee, SIAM Conference on Sparse Matrices, Coeur d'Alene, Idaho, Oct. 1996

Member program committee, Householder Symposium XIII, Pontresina, Switzerland, June 1996

Organizer, CERFACS Workshop on Optimization, International Linear Algebra Year, Albi, France, April 1996.

Organizer, CERFACS Workshop on Sparse Direct Methods, International Linear Algebra Year, Albi, France, Sept. 1995.

Member organizing committee, Householder XII, Symposium on Numerical Algebra, Los Angeles, California, June 1993

Member of advisory committee, IMA Year on Applied Linear Algebra, University of Minnesota, MN, 1991/92

Member of NAVF's Evaluation Committee of Informatics, Norway, 1992

Chairman and local organizer, Householder XI Symposium on Numerical Algebra, Tylösand, Sweden, June 1990

Member organizing committee, Gatlinburg X, Symposium on Numerical Algebra, Fairfield Glade, Tennessee, June 1987

Organizer, Joint U.S.–Scandinavian Symposium, on Scientific and Mathematical Modeling, Stockholm, Jan. 1985

Member program committee, COMPSTAT 1982, 5th Symposium on Computational Statistics, Toulouse, Sept. 1982.

Member program committee, COMPSTAT 1980. 4th Symposium on Computational Statistics, Edinburgh, Aug. 1980.

Chairman and Organizer, Mathematical and Numerical Methods for Inverse and Ill-Posed Problems, Linköping University, Jan. 1977

INVITED CONFERENCE TALKS

19th International Workshop on Matrices and Statistics, Shanghai, China, June 5–8, 2010.

Householder Symposium XVII, Zeuten, Germany, June 1–6, 2008.

Perspectives in Numerical Analysis, Helsinki University of Technology, Helsinki, Finland, May 27–29, 2008.

17th International Workshop on Matrices and Statistics, Uppsala, Sweden, June 13–17, 2006.

IMET 2004: Iterative Methods, Preconditioning, & Numerical PDEs, Czech Technical University, Prag, May 25–28, 2004,

Symposium on Optimization and Data Analysis, Australian National University, Canberra, Sept. 21–23, 2005,

Third International workshop on TLS and Errors-Variable-Modeling, Heverlee, Belgium, Aug. 27–29, 2001

Applied Inverse Problems: Theoretical and Computational Aspects, Montecatini Terme, Italy, June 18–22, 2001

Third Scandinavian Workshop on Linear Programming, Lyngby, Denmark, Aug. 26–28, 1999

NATO ASI meeting, Las Palmas, Gran Canaria, July 1996,

Workshop on Optimization, International Linear, Algebra Year, Albi, France, April 1996.

Mathematical Modeling and Computational Methods, Charles University, Prag, Aug. 1994.

Sparse Days at St Girons, CERFACS, St Girons, France, July 1994

Numerical Linear Algebra with Applications, Mathematisches Forschungsinstitut Oberwolfach, April 1994.

NATO Advanced Study Institute, Il Ciocco, Italy, Sept. 1993

SIAM Conference on Linear Algebra in Signal, Systems and Control, Seattle, Washington, Aug. 1993

Second Conference of the International Linear Algebra Society, Lisbon, Aug. 1992.

Fourth IMPA Summer Workshop, Rio de Janeiro, Brazil, Jan. 1992.

Dundee Biennial Conference on Numerical Analysis, Dundee, Scotland, June 1991.

Banach Semester on Computational Mathematics, Warszawa, Poland, March 1991

SIAM Conference on Applied Linear Algebra, Minneapolis, MN, Sept. 1991

Workshop and NATO Advanced Study Institute, Il Ciocco, Italy, Sept. 1990.

IBM Europe Institute 1990, Oberlech, Germany, Aug. 1990.

IMSL User Group Europe Conference, Bologna, March 1990

IBM Europe Institute 1989, Garmisch, Aug. 1989.

Workshop and NATO Advanced Study Institute, Leuven, July 1988.

Training Cycle on Supercomputers, CERFACS, Toulouse, April 1988.

Numerical Linear Algebra and Parallel Computations, Mathematisches Forschungsinstitut Oberwolfach, March 1988.

Advances in Reliable Numerical Computing, NPL, London, July 1987.

Conference on Modern Problems in Numerical Analysis, Moscow, USSR, Sept. 1986.

Dundee Biennial Conference on Numerical Analysis, Dundee, Scotland, July 1983.

Conference on Numerical Analysis, Zeist, Holland, Oct. 1982.

All Union Conference on Linear Algebra, Moscow, USSR, Aug. 1982

Banach Semester on Computational Mathematics, Warszawa, Poland, April 1980.

Mathematical Aspects of Computerized Tomography, Mathematisches Forschungsinstitut Oberwolfach, Germany, Feb. 1980

Gatlinburgh IX, Conference on Numerical Algebra, Waterloo, CA, July 1984.

Sept. 1979, International Symposium on Ill-Posed Problems: Theory and Practice, University of Delaware, Delaware

Symposium on Sparse Matrix Computations, Argonne National Laboratory, IL, Sept. 1975.

Books

1. G. Dahlquist and Å. Björck. *Numerical Methods and Scientific Computing*. Vol. I SIAM, Philadelphia, 2008. xxvii+717 pp., ISBN 0-89871-360-9
2. Å. Björck, *Numerical Methods for Least Squares Problems*, SIAM, Philadelphia, 1996. xvii+408 pp., ISBN 978-0-898716-44-3
3. G. Dahlquist and Å. Björck. *Metody Numeryczne*. Panstwowe Wydawnictwo Naukowe, 1987. 546 pp., ISBN 83-01-04276-1
4. G. Dahlquist and Å. Björck. *Numerical Methods*. Prentice-Hall, Englewood Cliffs, 1974. xvii+573 pp. ISBN 0-13-627315-7. (Translated into Chinese 1990). Reprinted by Dover Publ. Inc., 2003, ISBN 0-486-42807-9
5. Å. Björck and G. Dahlquist, *Numerische Methoden*, R. Oldenbourg Verlag, München, 1972, 374 pp., ISBN 3-486-33851-X,
6. Å. Björck and G. Dahlquist, *Numeriska Metoder*, Gleerups, Lund, 1969. viii+373 pp.

Journal Publications

1. S. J. Leon, Å. Björck, and W. Gander.. Gram–Schmidt orthogonalization: 100 years and more. *Numer. Linear Algebra Appl.*, (to appear), 2011.
2. Å. Björck. The calculation of linear least squares problems. *Acta Numerica*, 13:1–54, 2004.
3. M. Adlers and Å. Björck. Matrix stretching for sparse least squares problems. *Numer. Linear Algebra Appl.*, 7:51–65, 2000.
4. Å. Björck, P. Heggernes, and P. Matstoms. Methods for large scale total least squares problems. *SIAM J. Matrix Anal. Appl.*, 22:413–429, 2000.
5. Å. Björck and J. Y. Yuan. Preconditioners for least squares problems by LU factorization. *Electronic Trans. Numer. Anal.*, 8:26–35, 1998.
6. Å. Björck, T. Elfving, and Z. Strakoš. Stability of conjugate gradient and Lanczos methods for linear least squares problems. *SIAM J. Matrix Anal. Appl.*, submitted, 1996.
7. Å. Björck and C. C. Paige. Solution of augmented linear systems using orthogonal factorizations. *BIT*, 34:1–26, 1994.
8. Å. Björck. Numerics of Gram-Schmidt orthogonalization. *Linear Algebra Appl.*, 197–198:297–316, 1994.

9. Å. Björck, L. Eldén, and H. Park. Accurate downdating of least squares solutions. *SIAM J. Matrix Anal. Appl.*, 15:549–568, 1994.
10. Å. Björck, E. Grimme, and P. Van Dooren. An implicit shift bidiagonalization algorithm for ill-posed systems. *BIT*, 34:510–534, 1994.
11. Å. Björck and C. C. Paige. Loss and recapture of orthogonality in the modified Gram-Schmidt algorithm. *SIAM J. Matrix Anal. Appl.*, 13:176–190, 1992.
12. Å. Björck. Component-wise perturbation analysis and errors bounds for linear least square solutions. *BIT*, 31:238–244, 1991.
13. Å. Björck and Z. Zlatev. Exploiting the separability in the solution of systems of linear ordinary differential equations. *Computers and Mathematics with Applications*, pages 421–438, 1989.
14. Å. Björck. A bidiagonalization algorithm for solving ill-posed system of linear equations. *BIT*, 28:659–670, 1988.
15. Å. Björck. A direct method for sparse least squares problems with lower and upper bounds. *Numer. Math.*, 54:19–32, 1988.
16. Å. Björck. Stability analysis of the method of semi-normal equations for least squares problems. *Linear Algebra Appl.*, 88/89:31–48, 1987.
17. Å. Björck. A general updating algorithm for constrained linear least squares problems. *SIAM J. Sci. Statist. Comput.*, 5:394–402., 1984.
18. Å. Björck. A block QR algorithm for partitioning stiff differential systems. *BIT*, 23:329–345, 1983.
19. Å. Björck and I. S. Duff. A direct method for the solution of sparse linear least squares problems. *Linear Algebra Appl.*, 34:43–67, 1980.
20. Å. Björck and T. Elfving. Accelerated projection methods for computing pseudoinverse solutions of systems of linear equations. *BIT*, 19:145–163, 1979.
21. Å. Björck. Comment on the iterative refinement of least squares solutions. *J. Amer. Statist. Assoc.*, 73:161–166, 1978.
22. Å. Björck and G. H. Golub. Eigenproblems for matrices associated with periodic boundary conditions. *SIAM Review*, 19:5–16, 1977.
23. Å. Björck and T. Elfving. Algorithms for confluent Vandermonde systems. *Numer. Math.*, 21:130–137, 1973.
24. Å. Björck and G. H. Golub. Numerical methods for computing angles between linear subspaces. *Math. Comp.*, 27:579–594, 1973.

25. Å. Björck and N. Andersson. A new high order method of regula falsi type for computing a root of an equation. *BIT*, 13:1–12, 1973.
26. Å. Björck and V. Pereyra. Solution of Vandermonde system of equations. *Math. of Comp.*, 24:893–903, 1970.
27. Å. Björck and C. Bowie. An iterative algorithm for computing the best estimate of an orthogonal matrix. *SIAM J. Numer. Anal.*, 8:358–364, 1970.
28. Å. Björck. Iterative refinement of linear least squares solutions II. *BIT*, 8:8–30, 1968.
29. Å. Björck and G. H. Golub. Iterative refinement of linear least squares solution by Householder transformation. *BIT*, 7:322–337, 1967.
30. Å. Björck. Iterative refinement of linear least squares solutions I. *BIT*, 7:257–278, 1967.
31. Å. Björck. Solving linear least squares problems by Gram-Schmidt orthogonalization. *BIT*, 7:1–21, 1967.

Proceedings: Contributions and Edited Volumes

1. Å. Björck. QR factorization of the Jacobian in some structured nonlinear least squares problems. In S. Van Huffel and P. Lemmerling, editors, *Total Least Squares and Errors-in-Variables Modeling. Analysis, Algorithms and Applications*, 225–235, Kluwer Academic Publishers, Dordrecht, 2002.
2. Å. Björck. Newton and Rayleigh quotient methods for total least squares problems. In S. Van Huffel, editor, *Recent Advances in Total Least Squares Techniques and Errors-in-Variables Modeling*, pages 149–160, Philadelphia, 1997. SIAM.
3. Å. Björck. Numerical stability of methods for solving augmented systems. In S. Reich and Y. Censor, editors, *Proceedings on Optimization and Nonlinear Analysis, Joint AMS-IMU Conference, Jerusalem, May 1995*, Vol. 434 of *NATO-ASI Series C: Mathematical and Physical Sciences*. AMS, 1996.
4. Å. Björck. Generalized and sparse least squares problems. In E. Spedicato, editor, *Algorithms for Continuous Optimization. The State of the Art*, Vol. 434 of *NATO-ASI Series C: Mathematical and Physical Sciences*, pages 37–80, Berlin, 1994. Kluwer Academic Publisher.
5. Å. Björck. Pivoting and stability in the augmented system method. In D. F. Griffiths and G. A. Watson, editors, *Numerical Analysis 1991: Proceedings of the 14th Dundee Conference, June 1991*, Pitman Research Notes in Mathematics 260, pages 1–16. Longman Scientific and Technical, 1992.

6. Å. Björck. Algorithms for linear least squares problems. In E. Spedicato, editor, *Computer Algorithms for Solving Linear Algebraic Equations; The State of the Art.*, Vol. 77 of *NATO-ASI Series F: Computer and Systems Sciences*, pages 57–92, Berlin, 1991. Springer-Verlag.
7. Å. Björck. Error analysis of least squares algorithms. In G. H. Golub and P. Van Dooren, editors, *Numerical Linear Algebra, Digital Signal Processing and Parallel Algorithms*, NATO-ASI Series, pages 41–73, Berlin, 1991. Springer-Verlag.
8. Å. Björck. Least squares methods. In P. G. Ciarlet and J. L. Lions, editors, *Handbook of Numerical Analysis*, volume I: Finite Difference Methods-Solution of Equations in R^n , pages 466–647. Elsevier/North Holland, Amsterdam, 1990.
9. Å. Björck. Iterative refinement and reliable computing. In M. G. Cox and S. J. Hammarling, editors, *Reliable Numerical Computation*, pages 249–266, Oxford, 1990. Clarendon Press.
10. Å. Björck. Some methods for separating stiff components in initial value problems. In D. F. Griffiths, editor, *Proceedings of the 1983 Dundee Biennial conference on numerical analysis*. Springer-Verlag, 1983.
11. Å. Björck, R. J. Plemmons and H. Schneider (eds.), *Large Scale Matrix Problems*, North-Holland, 1981.
12. Å. Björck and L. Eldén. Methods in numerical algebra for ill-posed problems. Proceedings of the International Symposium on Ill-Posed Problems: Theory and Practice, Delaware, 1979.
13. Å. Björck. SSOR preconditioning methods for sparse least squares problems. In *Proceedings of the Computer Science and Statistics 12th Annual Symposium on the Interface*, pages 21–25. University of Waterloo, Canada, 1979.
14. Å. Björck. Methods for sparse least squares problems. In J. R. Bunch and D. J. Rose, editors, *Sparse Matrix Computations*, pages 177–199, New York, 1976. Academic Press.
15. Å. Björck. A uniform numerical method for linear estimation from general Gauss-Markoff models. In *Proceedings in Computational Statistics*, Wien, 1974. Physica Verlag.