CURRICULUM VITÆ CARL(-WILHELM REINHOLD) de BOOR

EDUCATION

Universität Hamburg	1956 - 1959
Harvard University	1959 - 1960
University of Michigan, Ph.D.	1964 - 1966
Chairman of Ph.D. Committee:	R.C.F. Bartels

PROFESSIONAL EXPERIENCE

Research Assistant to G. Birkhoff	Harvard University	1959 - 60
Assoc. Sr. Research Mathematician	GM Research Labs.	1960-64
Assistant Prof. of Math. and Comp.Sci.	Purdue University	1966 - 68
Associate Prof. of Math. and Comp.Sci.	Purdue University	1968 - 72
Visiting Associate Prof. of Math.	Univ. of Michigan	1970 - 71
Visiting Staff Member	Los Alamos Labs.	1970 - 95
Professor of Math. and Comp.Sci.	U. Wisconsin-Madison	1972 - 83
Member, Mathematics Research Center	U. Wisconsin-Madison	1972 - 87
P.L. Chebyshev Professor of		
Mathematics and Computer Science	U. Wisconsin-Madison	1983 - 2003
Steenbock Professor of Math.Sciences	U. Wisconsin-Madison	1987-2003
Member, Advisory Board	Intern. Math. Statist.	1978 - 91
	Libraries, Inc.	
Emeritus Professor	U. Wisconsin-Madison	2003 -
Affiliated Professor	U. Washington	2004-

PROFESSIONAL SOCIETIES AND HONORS

American Mathematical Society 1960–1988, Phi Beta Kappa, Assoc. Comput. Machinery Spec. Int. Group Numer. Math. 1970–1999, Soc. for Industrial and Applied Mathematics.

Invited speaker, Internat. Congr. Mathem., Helsinki,'78; Fairchild Scholar Caltech '85; Fellow of the Amer. Acad. Arts and Sciences '87; Humboldt Research Prize (Humboldt Foundation, Germany) '92; member of the National Academy of Engineering '93; Dr.Sc. h.c., Purdue U., '93; J.v.Neumann Prize, SIAM, '96; member of the National Academy of Sciences '97; member of the Academia Leopoldina (German Academy of Sciences) '98; foreign member of the Polish Academy of Sciences '00; Dr.Sc. h.c., Technion (Israel), '02; Hilldale Award (U. Wisconsin) '02; 2003 National Medal of Science '05; Fellow of SIAM '09; 2008 John Gregory Memorial Award, '11.

RESEARCH INTERESTS

Approximation Theory, Numerical Analysis

VITA

Born 3 December 1937 in Stolp, Germany; U.S. Citizen; married; four children.

SELECTED INVITED ADDRESSES

SIAM-SIGNUM Fall Meeting, Austin TX, October 1972. Conference on the Numerical Solution of Differential Equations, Dundee, Scotland, July 1973. 2nd Symposium on Approximation Theory, Austin TX, January 18–21, 1976. 745th Meeting of the American Mathematical Society, Evanston IL, April 15–16, 1977. International Congress of Mathematicians, Helsinki, August 15–23, 1978. Rutishauser Symposium, Eidgen. Techn. Hochschule, Zürich, Switzerland, October 15–17, 1980. 1981 Applied Math. Conference, Applied Math. Div. of Australian Math. Soc., Victor Harbor, S.A., February 8–12, 1981. Gatlinburg VIII, Oxford, England, July 6–10, 1981. G.E. Whitney Symposium on Numerical methods for modeling phenomena, General Electric, September 29–October 2, 1981. May 9–11, 1983. Scotland, June 28–July 1, 1983. Sino-American Workshop on Approximation Theory, Hangzhou, PRC, May 13-17, 1985. Distinguished Lecture Series, C.S., Purdue U., Apr.4, 1988. US-USSR Approximation Theory Conference, Tampa FL, March 19–24, 1990. Mathematiker-Kongress der DDR 1990, Dresden, East Germany, September 10–14, 1990. 7th Texas Intern.Symp. on Approx.Theory, Austin TX 3–7 Jan 1992. Schwäbisches Mathematik-Kolloquium, 28 June 1993. Samuel D. Conte Distinguished Lecture Series, CS Department, Purdue U., 5 April 1994. SIAM-SEAS conference, Charleston SC, 24-25 March 1995. J. von Neumann Lecture, SIAM annual meeting, 22–26 July 1996. Conference on Numerical Mathematics (celebrating the 60th Birthday of M.J.D. Powell), 27–30 Jul 1996. ILAS-LAA lecture, ILAS annual meeting, May 1998. International Symposium on Computational Sciences (celebrating the contributions of John R. Rice), Purdue U., 21-22 May 1999. Centre of Mathematics for Applications, Oslo, Norway, 1-2 September 2003. 11th Texas Intern.Symp. on Approx.Theory, Gatlinburg TN 18–22 May 2004. 6th Internat. Conf. Mathem. Methods Curves and Surfaces, Tromsø, Norway, 1–6 July 2004. Wavelet Theory and Applications: New Directions and Challenges, 10–14 August 2004, Singapore. Approximation Theory and Probability (honoring Zbigniew Ciesielski's 70th), Bedlewo, Poland, 20–24 September 2004. MAIA 2004, Hohenheim, Germany, 13–17 October 2004. Extremal Problems and Approximation (honoring V.M. Tikhomirov's 70th), Moscow, Russia, 16–18 December 2004. International Conference on Applicable Harmonic Analysis, Hangzhou, China, 23–27 May 2005. Constructive Theory of Functions - 2005, Varna, Bulgaria, 1–7 June 2005. MAIA 2007, Alesund (Norway), 22-26aug07. FoCM 2008, City U., Hongkong, Workshop on Approximation Theory, 20-22jun08. ICASC08: Approximation in Scientific Computing Institute of Software, Chinese Academy of Science, Beijing 27-31 oct08. Australia New Zealand Mathematics Convention, Christchurch NZ, 8-12 dec08. SAGA School, Vilnius, Lithuania, 27-30sep11. Topics in Modern Approximation Theory, Ein Gedi, Israel, 4-7 jan12. City U., Hongkong, Internat. Conf. on Approximation Theory and Applications, 20-24may13.

Publications

- 1 (C. de Boor) Bicubic spline interpolation, J. Math. and Phys. 41(3) (1962), 212–218.
- 2 (C. de Boor and J. R. Rice) Chebyshev approximation by $a \prod (x r_i)/(x + s_i)$ and application to ADI iteration, J. SIAM **11** (1963), 159–169.
- 3 (C. de Boor) Best approximation properties of spline functions of odd degree, Indiana Univ. Math. J. (formally J. Math. Mech.) 12 (1963), 747–750.
- 4 (G. Birkhoff and C. de Boor) Error bounds for spline interpolation, Indiana Univ. Math. J. (formally J. Math. Mech.) **13** (1964), 827–835.
- 5 (C. de Boor and J. R. Rice) Tensor products and commutative matrices, J. SIAM 12 (1964), 892–896.
- 6 (G. Birkhoff and C. R. de Boor) Piecewise polynomial interpolation and approximation, in "Approximation of Functions", (H. L. Garabedian, ed), Elsevier, 1965, 164–190.
- 7 (C. de Boor and R. E. Lynch) On splines and their minimum properties, *Indiana Univ. Math. J. (formally J. Math. Mech.)* **15** (1966), 953–969.
- 8 (G. Birkhoff, C. de Boor, B. Swartz, and B. Wendroff) Rayleigh-Ritz approximation by piecewise cubic polynomials, *SIAM J. Numer. Anal.* **3** (1966), 188–203.
- 9 (C. de Boor) The method of projections as applied to the numerical solution of two point boundary value problems using cubic splines, dissertation, Univ. Michigan, 1966.
- 10 (C. de Boor) On local spline approximation by moments, *Indiana Univ. Math. J.* (formally J. Math. Mech.) **17** (1968), 729–735.
- 11a (C. de Boor and J. R. Rice) "Least squares cubic spline approximation I. Fixed knots", Comp.Sci.Dpt. TR 20, Purdue University, 1968.
- 11b (C. de Boor and J. R. Rice) "Least squares cubic spline approximation II. Variable knots", Comp.Sci.Dpt. TR 21, Purdue University, 1968.
- 12 (C. de Boor) On uniform approximation by splines, J. Approx. Theory 1 (1968), 219–235.
- 13 (C. de Boor) On the convergence of odd-degree spline interpolation, J. Approx. Theory 1 (1968), 452–463.
- 14 (C. de Boor) On the approximation by γ-polynomials, in "Approximation with Special Emphasis on Spline Functions", (I. J. Schoenberg, ed), Academic Press, 1969, 157– 183.
- 15 (C. de Boor) On writing an automatic integration algorithm, in "Mathematical Software", (J. R. Rice, ed), Academic Press, 1971, 201–209.
- 16 (C. de Boor) CADRE: An algorithm for numerical quadrature, in *"Mathematical Software"*, (J. R. Rice, ed), Academic Press, 1971, 417–449.
- 17 (C. de Boor and G. J. Fix) Spline approximation by quasiinterpolants, J. Approx. Theory 8 (1973), 19–45.
- 18 (C. de Boor) On calculating with B-splines, J. Approx. Theory 6 (1972), 50–62.
- 18a (C. de Boor) "Subroutine package for calculating with B-splines", Techn.Rep. LA-4728-MS, Los Alamos Sci.Lab, Los Alamos NM, 1971. Published as "Package for calculating with B-splines", SIAM J. Numer. Anal., 14, 1977, 441–472.
- 19 (C. de Boor and S. Conte) Elementary numerical analysis. An algorithmic approach, 2nd edition, x + 396p, MacGraw-Hill, 1972.

- 20 (C. de Boor and B. Swartz) Collocation at Gaussian points, SIAM J. Numer. Anal. 10(4) (1973), 582–606.
- 21 (C. de Boor) Good approximation by splines with variable knots, in "Spline Functions and Approximation Theory, ISNM 21", (A. Meir and A. Sharma, eds), Birkhäuser Verlag, 1973, 57–72.
- 22 (C. de Boor) Appendix to 'Splines and histograms' by I. J. Schoenberg, in "Spline Functions and Approximation Theory, ISNM 21", (A. Meir and A. Sharma, eds), Birkhäuser Verlag, 1973, 329–358.
- 23 (C. de Boor and I. J. Schoenberg) Unique prime factorization and lattice points, Math. Mag. 46 (1973), 198–203.
- 24 (C. de Boor) The quasi-interpolant as a tool in elementary polynomial spline theory, in *"Approximation Theory"*, (G. G. Lorentz *et al.*, eds), Academic Press, 1973, 269–276.
- 25 (C. de Boor) Package for calculating with B-splines, SIAM J. Numer. Anal. 14 (1977), 441–472.
- 26 (C. de Boor and J. W. Daniel) Splines with nonnegative B-spline coefficients, Math. Comp. 28(126) (1974), 565–568.
- 27 (C. de Boor) Bounding the error in spline interpolation, *SIAM Review* **16** (1974), 531–544.
- 28 (C. de Boor) Good approximation by splines with variable knots. II, in "Numerical Solution of Differential Equations", (G. A. Watson, ed), Springer, 1974, 12–20.
- 29 (C. de Boor) On bounding spline interpolation, J. Approx. Theory 14(3) (1975), 191–203.
- 30 (C. de Boor) Total positivity of the spline collocation matrix, *Indiana Univ. Math. J.* 25(6) (1976), 541–551.
 perfectsplines
- 31 (C. de Boor) A remark concerning perfect splines, Bull. Amer. Math. Soc. 80(4) (1974), 724–727.
- 32 (C. de Boor) On cubic spline functions that vanish at all knots, Advances in Math. **20** (1976), 1–17.
- 33 (C. de Boor) How small can one make the derivatives of an interpolating function?,
 J. Approx. Theory 13 (1975), 105–116.
- 34 (C. de Boor) On 'best' interpolation, J. Approx. Theory 16 (1976), 28-42.
- 35 (C. de Boor) Polynomial spline functions and extensions, xxx, 19xx.
- 36 (C. de Boor) A smooth and local interpolant with 'small' k-th derivative, in "Numerical Solutions of Boundary Value Problems for Ordinary Differential Equations", (A. Aziz, ed), Academic Press, 1975, 177–197.
- 37 (C. de Boor) Quadratic spline interpolation and the sharpness of Lebesgue's inequality,
 J. Approx. Theory 17 (1976), 348–358.
- 38 (C. de Boor) On the cardinal spline interpolant to e^{iut} , SIAM J. Math. Anal. 7 (1976), 930–941.
- 39 (C. de Boor and I. J. Schoenberg) Cardinal interpolation and spline functions VIII: The Budan-Fourier theorem for splines and applications, in *"Spline Functions, Karls-ruhe 1975"*, (K. Böhmer, G. Meinardus, and W. Schempp, eds), Lecture Notes in Math. 501, Springer, 1976, 1–77.

- 40 (C. de Boor, T. Lyche, and L. L. Schumaker) On calculating with B-splines II. Integration, in "Numerische Methoden der Approximationstheorie Vol. 3, ISNM 30", (L. Collatz, G. Meinardus, and H. Werner, eds), Birkhäuser Verlag, 1976, 123–146.
- 41 (C. de Boor) A bound on the L_{∞} -norm of L_2 -approximation by splines in terms of a global mesh ratio, *Math. Comp.* **30(136)** (1976), 765–771.
- 42 (C. de Boor) On local linear functionals which vanish at all B-splines but one, in *"Theory of Approximation with Applications"*, (A. G. Law and N. B. Sahney, eds), Academic Press, 1976, 120–145.
- 43 (C. de Boor and A. Pinkus) Backward error analysis for totally positive linear systems, Numer. Math. 27 (1977), 485–490.
- 44 (C. de Boor and B. Swartz) Comments on the comparison of global methods for linear two-point boundary value problems, *Math. Comp.* **31(140)** (1977), 916–921.
- 45 (C. de Boor) Splines as linear combinations of B–splines. A survey, in "Approximation Theory, II", (G. G. Lorentz, C. K. Chui, and L. L. Schumaker, eds), Academic Press, 1976, 1–47.
- 46 (C. de Boor and B. Swartz) Piecewise monotone interpolation, J. Approx. Theory **21(4)** (1977), 411–416.
- 47 (C. de Boor and Richard Weiss) SOLVEBLOK : A package for solving almost block diagonal linear systems, ACM Trans. Math. Software 6 (1980), 80–87.
- 48 (C. de Boor) Odd-degree spline interpolation at a biinfinite knot sequence, in "Quantitative Approximation", (R. Schaback and K. Scherer, eds), Lecture Notes 556, Springer, 1976, 30–53.
- 49 (C. de Boor) Computational aspects of optimal recovery, in "Optimal Estimation in Approximation Theory", (C. Micchelli and T. Rivlin, eds), Plenum, 1977, 69–91.
- 50 (C. de Boor and G. H. Golub) The numerically stable reconstruction of a Jacobi matrix from spectral data, *Linear Algebra Appl.* **21** (1978), 245–260.(reprinted in (Milestones in Matrix Computations, The selected works of Gene H. Golub, with commentaries), Raymond H. Chan, Chen Greif and Dianne O'Leary (eds), Oxford University Press (Oxford, England), 2007)
- 51 (C. de Boor and A. Pinkus) Proof of the conjectures of Bernstein and Erdös concerning the optimal nodes for polynomial interpolation, J. Approx. Theory 24 (1978), 289–303.
- 52 (C. de Boor and J. R. Rice) An adaptive algorithm for multivariate approximation giving optimal convergence rates, J. Approx. Theory 25 (1979), 337–359.
- 53 (C. de Boor) Efficient computer manipulation of tensor products, ACM Trans. Math. Software 5 (1979), 173–182. Corrigenda: 525;
- 54 (C. de Boor) A comment on 'Numerical comparisons of algorithms for polynomial and rational multivariate approximations', *SIAM J. Numer. Anal.* **15** (1978), 1208–1211.
- 55 (C. de Boor) The approximation of functions and linear functionals: Best vs. good approximation, in "Proceedings of Symposia in Applied Mathematics 22", (G. H. Golub and J. Oliger, eds), AMS, 1978, 53–70.
- 56 (C. de Boor and B. Swartz) Collocation approximation to eigenvalues of an ordinary differential equation: The principle of the thing, *Math. Comp.* **35** (1980(151)), 679– 694.
- 57 (C. de Boor) A Practical Guide to Splines, xvii + 392p, Springer-Verlag, 1978.

- 58 (C. de Boor) Polynomial interpolation, in "Proceedings International Congress of Mathematicians, Helsinki 1978", (xxx, eds), xxx, 1980, 917–922.
- 59 (C. de Boor and Richard Weiss) Algorithm 546 SOLVEBLOK [F4], ACM Trans. Math. Software 6 (1980), 88–91.
- 60 (C. de Boor, R. DeVore, and K. Höllig) Mixed norm *n*-widths, *Proc. Amer. Math. Soc.* 80(4) (1980), 577–583.
- 61 (C. de Boor and J. B. Rosser) *Pocket calculator supplement to calculus*, vi + 291p, Addison-Wesley, 1979.
- 62 (C. de Boor) How does Agee's smoothing method work?, in "Proceedings of the 1979 Army Numerical Analysis and Computers Conference", (xxx, ed), ARO Rept. 79-3, Army Research Office, 1979, 299–302.
- 63 (C. de Boor and S. Conte) *Elementary numerical analysis*, 3rd edition, xii + 428p, McGraw-Hill, 1980.
- 64 (C. de Boor) FFT as nested multiplication, with a twist, *SIAM J. Sci. Statist. Comput.* 1 (1980), 173–178.
- 65 (C. de Boor) Convergence of abstract splines, J. Approx. Theory **31** (1981), 80–89.
- 66 (C. de Boor) On a max-norm bound for the least-squares spline approximant, in "Approximation and Function Spaces", (C. Ciesielski, ed), North Holland, 1981, 163– 175.
- 67 (C. de Boor) What is the main diagonal of a biinfinite band matrix?, in "Quantitative Approximation", (R. DeVore and K. Scherer, eds), Academic Press, 1980, 11–23.
- 67a (C. de Boor) The numerical calculation of spline approximations on a biinfinite knot sequence, in "Approximation Theory and Applications", (Z. Ziegler, ed), Academic Press, 1981, 13–22.
- 68 (C. de Boor and B. Swartz) Collocation approximation to eigenvalues of an ordinary differential equation: Numerical illustrations, *Math. Comp.* **36(153)** (1981), 1–19.
- 69 (C. de Boor) Dichotomies for band matrices, SIAM J. Numer. Anal. 17 (1980), 894–907.
- 70 (C. de Boor and B. Swartz) Local piecewise polynomial projection methods for an O.D.E. which give high-order convergence at knots, *Math. Comp.* 36(153) (1981), 21–33.
- 71 (C. de Boor) The inverse of a totally positive bi-infinite band matrix, Trans. Amer. Math. Soc. 274(1) (1982), 45–58.
- 72 (C. de Boor and J. R. Rice) Extremal polynomials with application to Richardson iteration for indefinite linear systems, *SIAM J. Sci. Statist. Comput.* **3** (1982), 47–57.
- 73 (C. de Boor and A. Pinkus) The approximation of a totally positive band matrix by a strictly totally positive one, *Linear Algebra Appl.* **42** (1982), 81–98.
- 73a (C. de Boor and A. Pinkus) "A factorization of totally positive band matrices", MRC Tech. Summ. Rpt. 2163, 1981.
- 74 (C. de Boor, S. Friedland, and A. Pinkus) Inverses of infinite sign regular matrices, *Trans. Amer. Math. Soc.* 274(1) (1982), 59–68.
- 75 (C. de Boor) "Smooth and rough interpolation", Res.Rep. 81-03, Seminar für Angew. Math., ETH, Zürich, 1981.

- 76 (C. de Boor and R. DeVore) Approximation by smooth multivariate splines, *Trans. Amer. Math. Soc.* **276** (1983), 775–788.
- 76a (C. de Boor, R. DeVore, and K. Höllig) Approximation order from smooth bivariate pp functions, in "Approximation Theory IV", (C. Chui, L. Schumaker, and J. Ward, eds), Academic Press, 1983, 353–357.
- 77 (C. de Boor and K. Höllig) Recurrence relations for multivariate B-splines, *Proc.* Amer. Math. Soc. 85(3) (1982), 397–400.
- 78 (C. de Boor and K. Höllig) B-splines from parallelepipeds, J. Analyse Math. 42 (1982/83), 99–115.
- 79 (C. de Boor, Rong-Qing Jia, and A. Pinkus) Structure of invertible (bi)infinite totally positive matrices, *Linear Algebra Appl.* 47 (1982), 41–55.
- 80 (C. de Boor, F. de Hoog, and H. B. de Keller) Stability of one-step schemes for first-order two-point boundary value problems, *SIAM J. Numer. Anal.* **20** (1983), 1139–1146.
- 81 (C. de Boor) Topics in multivariate approximation theory, in *"Topics in Numerical Analysis"*, (P. Turner, ed), Lecture Notes 965, Springer, 1982, 39–78.
- 82 (C. de Boor and K. Höllig) Approximation order from bivariate C¹-cubics: a counterexample, Proc. Amer. Math. Soc. 87 (1983), 649–655.
- 83 (C. de Boor and K. Höllig) Bivariate box splines and smooth pp functions on a three direction mesh, J. Comput. Appl. Math. 9 (1983), 13–28.
- 84 (C. de Boor and F. de Hoog) Stability of finite difference schemes for two-point boundary value problems, *SIAM J. Numer. Anal.* **23** (1986), 925–935.
- 85 (C. de Boor, K. Höllig, and S. Riemenschneider) Bivariate cardinal interpolation by splines on a three-direction mesh, *Illinois J. Math.* **29(4)** (1985), 533–566.
- 85a (C. de Boor, K. Höllig, and S. Riemenschneider) Bivariate cardinal interpolation, in *"Approximation Theory IV"*, (C. Chui, L. Schumaker, and J. Ward, eds), Academic Press, 1983, 359–363.
- 86 (C. de Boor) A naive proof of the representation theorem for isotropic, linear asymmetric stress strain relations, J. of Elasticity 15 (1985), 225–227.
- 87 (C. de Boor and R. DeVore) A geometric proof of total positivity for spline interpolation, *Math. Comp.* 45(172) (1985), 497–504.
- 88 (C. de Boor and R. DeVore) Partitions of unity and approximation, Proc. Amer. Math. Soc. 93(4) (1985), 705–709.
- 89 (C. de Boor and E. Saff) Finite sequences of orthogonal polynomials connected by a Jacobi matrix, *Linear Algebra Appl.* **75** (1986), 43–55.
- 90 (C. de Boor, K. Höllig, and S. Riemenschneider) Convergence of bivariate cardinal interpolation, *Constr. Approx.* 1 (1985), 183–193.
- 91 (C. de Boor and Rong-Qing Jia) Controlled approximation and a characterization of the local approximation order, *Proc. Amer. Math. Soc.* **95** (1985), 547–553.
- 92 (C. de Boor, K. Höllig, and S. Riemenschneider) Some qualitative properties of bivariate Euler-Frobenius polynomials, J. Approx. Theory 50 (1987), 8–17.
- 93 (C. de Boor and K. Höllig) Minimal support for bivariate splines, *Approx. Theory Appl.* **3** (1987), 11–23.

- 94 (C. de Boor and K. Höllig) Approximation power of smooth bivariate pp functions, Math. Z. 197 (1988), 343–363.
- 95 (C. de Boor) B-form basics, in "Geometric Modeling: Algorithms and New Trends", (G. E. Farin, ed), SIAM Publications, 1987, 131–148.
- 96 (C. de Boor and H.-O. Kreiss) On the condition of linear systems associated with discretized BVPs of ODEs, *SIAM J. Numer. Anal.* **23** (1986), 936–939.
- 97 (C. de Boor, K. Höllig, and S. Riemenschneider) Convergence of cardinal series, *Proc. Amer. Math. Soc.* **98(3)** (1986), 457–460.
- 97a (C. de Boor, K. Höllig, and S. D. Riemenschneider) On bivariate cardinal interpolation, in "Constructive Function Theory", (B. Penkov and D. Vacov, eds), Bulgarian Academy of Sciences, 1972, 254–259.
- 97b (C. de Boor, K. Höllig, and S. Riemenschneider) The limits of multivariate cardinal splines, in *"Multivariate Approximation Theory III, ISNM 75"*, (W. Schempp and K. Zeller, eds), Birkhäuser, 1985, 47–50.
- 98 (C. de Boor and K. Höllig) B-splines without divided differences, in "Geometric Modeling: Algorithms and New Trends", (G. E. Farin, ed), SIAM Publications, 1987, 21–27.
- 99 (C. de Boor) The polynomials in the linear span of integer translates of a compactly supported function, *Constr. Approx.* **3** (1987), 199–208.
- 100 (C. de Boor) Multivariate approximation, in "State of the Art in Numerical Analysis",
 (A. Iserles and M. Powell, eds), Institute Mathematics Applications, 1987, 87–109.
- 101 (C. de Boor) Cutting corners always works, Comput. Aided Geom. Design 4 (1987), 125–131.
- 102 (C. de Boor, K. Höllig, and M. Sabin) High accuracy geometric Hermite interpolation, Comput. Aided Geom. Design 4 (1987), 269–278.
- 103 (C. de Boor) The condition of the B-spline basis for polynomials, SIAM J. Numer. Anal. 25 (1988), 148–152.
- 104 (C. de Boor, K. Höllig, and S. Riemenschneider) Fundamental solutions for multivariate difference equations, Amer. J. Math. 111 (1989), 403–415.
- 105 (C. de Boor) The exact condition of the B-spline basis may be hard to determine, J. Approx. Theory **60** (1990), 344–359.
- 106 (C. de Boor) What is a multivariate spline?, in "Proc. First Intern. Conf. Industr. Applied Math., Paris 1987", (J. McKenna and R. Temam, eds), SIAM, 1988, 90–101.
- 107 (C. de Boor) B(asic)-spline basics, in "Fundamental Developments of Computer-Aided Geometric Modeling", (Les Piegl, ed), Academic Press, 1993, 27–49.
- 108 (C. de Boor and K. Höllig) Box-spline tilings, Amer. Math. Monthly 98 (1991), 793–802.
- 109 (C. de Boor and A. Ron) On multivariate polynomial interpolation, Constr. Approx.
 6 (1990), 287–302.
- 109a (C. de Boor and A. Ron) The limit at the origin of a smooth function space, in "Approximation Theory VI", (C. Chui, L. Schumaker, and J. Ward, eds), Academic Press, 1989, 93–96.
- 110 (C. de Boor) A local basis for certain smooth bivariate pp spaces, in "Multivariate Approximation Theory IV, ISNM 90", (C. Chui, W. Schempp, and K. Zeller, eds),

Birkhäuser Verlag, 1989, 25–30.

- 111 (C. de Boor) Local corner cutting and the smoothness of the limiting curve, *Comput. Aided Geom. Design* 7 (1990), 389–397.
- 112 (C. de Boor and A. Ron) On polynomial ideals of finite codimension with applications to box spline theory, J. Math. Anal. Appl. 158 (1991), 168–193.
- 113 (C. de Boor, N. Dyn, and A. Ron) On two polynomial spaces associated with a box spline, *Pacific J. Math.* **147** (1991), 249–267.
- 114 (C. de Boor and A. Ron) Polynomial ideals and multivariate splines, in "Multivariate Approximation Theory IV, ISNM 90", (C. Chui, W. Schempp, and K. Zeller, eds), Birkhäuser Verlag, 1989, 31–40.
- 115 (C. de Boor) Spline Toolbox (for use with MATLAB), The MathWorks, Inc., 1990.
- 116 (C. de Boor) Quasiinterpolants and approximation power of multivariate splines, in *"Computation of Curves and Surfaces"*, (W. Dahmen, M. Gasca, and C. Micchelli, eds), Kluwer, 1990, 313–345.
- 117 (C. de Boor and A. Ron) The exponentials in the span of the multiinteger translates of a compactly supported function: quasiinterpolation and approximation order, J. London Math. Soc.(2) 45 (1992), 519–535.
- 118 (C. de Boor) An empty exercise, ACM SIGNUM Newsletter 25(4) (1990), 2–6.
- 119 (C. de Boor) Polynomial interpolation in several variables, in "Studies in Computer Science (in Honor of Samuel D. Conte)", (R. DeMillo and J. R. Rice, eds), Plenum Press, 1994, 87–119.
- 120 (C. de Boor) An alternative approach to (the teaching of) rank, basis and dimension, Linear Algebra Appl. 146 (1991), 221–229.
- 121 (C. de Boor and A. Ron) Computational aspects of polynomial interpolation in several variables, *Math. Comp.* 58 (1992), 705–727.
- 122 (C. de Boor and A. Ron) The least solution for the polynomial interpolation problem, Math. Z. 210 (1992), 347–378.
- 123 (C. de Boor) Splinefunktionen, 184p, Birkhäuser, 1990.
- 124 (C. de Boor and Rong-Qing Jia) A sharp upper bound on the approximation order of smooth bivariate pp functions, J. Approx. Theory 72(1) (1993), 24–33.
- 125 (C. de Boor and A. Ron) Fourier analysis of the approximation power of principal shift-invariant spaces, *Constr. Approx.* 8 (1992), 427–462.
- 126 (C. de Boor, R. DeVore, and A. Ron) Approximation from shift-invariant subspaces of $L_2(\mathbb{R}^d)$, Trans. Amer. Math. Soc. **341** (1994), 787–806.
- 127 (C. de Boor) On the error in multivariate polynomial interpolation, Applied Numerical Mathematics 10(3-4) (1992), 297–305.
- 128 (C. de Boor, R. DeVore, and A. Ron) The structure of finitely generated shift-invariant spaces in $L_2(\mathbb{R}^d)$, J. Funct. Anal. **119(1)** (1994), 37–78.
- 129 (C. de Boor, R. DeVore, and A. Ron) On the construction of multivariate (pre)wavelets, *Constr. Approx.* **9** (1993), 123–166.
- 130 (C. de Boor, K. Höllig, and S. D. Riemenschneider) Box Splines, xvii + 200p, Springer-Verlag, 1993.
- 131 (C. de Boor) Approximation order without quasi-interpolants, in "Approximation Theory VII", (E. W. Cheney, C. Chui, and L. Schumaker, eds), Academic Press, 1992,

1 - 18.

- 132 (C. de Boor, A. Ron, and Zuowei Shen) On ascertaining inductively the dimension of the joint kernel of certain commuting linear operators, Advances in Appl. Math. 17 (1996), 209–250.
- 133 (C. de Boor) Multivariate piecewise polynomials, Acta Numerica (1993), 65–109.
- 134 (C. de Boor) On the evaluation of box splines, Numer. Algorithms 5 (1993), 5–23.
- 135 (C. de Boor, N. Dyn, and A. Ron) Polynomial interpolation to data on flats in \mathbb{R}^d , J. Approx. Theory **105(2)** (2000), 313–343.
- 136 (C. de Boor) Gauss elimination by segments and multivariate polynomial interpolation, in "Approximation and Computation: Festschrift in Honor of Walter Gautschi", (R. V. M. Zahar, ed), ISNM 119, Birkhäuser Verlag, 1994, 1–22.
- 137 (C. de Boor) A multivariate divided difference, in "Approximation Theory VIII, Vol. 1: Approximation and Interpolation", (Charles K. Chui and Larry L. Schumaker, eds), World Scientific Publishing Co., Inc., 1995, 87–96.
- 138 (C. de Boor) On the Sauer-Xu formula for the error in multivariate polynomial interpolation, *Math. Comp.* **65** (1996), 1231–1234.
- 139 (C. de Boor, A. Ron, and Zuowei Shen) On ascertaining inductively the dimension of the joint kernel of certain commuting linear operators. II, Advances in Math. 123(2) (1996), 223-242.
- 140 (C. de Boor) On the Meir/Sharma/Hall/Meyer analysis of the spline interpolation error, in "Approximation Theory and Optimization", (M. D. Buhmann and A. Iserles, eds), Cambridge University Press, 1997, 47–58.
- 140a (C. de Boor) "Convergence of cubic spline interpolation with the not-a-knot condition", MRC TSR #2876, 1985.
- 141 (C. de Boor) The multiplicity of a spline zero, Annals of Numerical Mathematics 4 (1997), 229–238.
- 142 (C. de Boor, R. DeVore, and A. Ron) Approximation orders of FSI spaces in $L_2(\mathbb{R}^d)$, Constr. Approx. 14 (1998), 631–652.
- 143 (C. de Boor) "Error and Newton form in multivariate polynomial interpolation", ms, 1995.
- 144 (C. de Boor) The error in polynomial tensor-product, and in Chung-Yao, interpolation, in "Surface Fitting and Multiresolution Methods", (A. LeMéhauté, C. Rabut, and L. L. Schumaker, eds), Vanderbilt University Press, 1997, 35–50.
- 145 (C. de Boor) Calculation of the smoothing spline with weighted roughness measure, Math. Models Methods Appl. Sci. 11(1) (2001), 33–41.
- 146 (C. de Boor) Computational aspects of multivariate polynomial interpolation: Indexing the coefficients, *Advances in Comp. Math.* **12** (2000), 289–301.
- 147 (C. de Boor) On Ptak's derivation of the Jordan normal form, *Linear Algebra Appl.* **310** (2000), 9–10.
- 148 (C. de Boor) A Practical Guide to Splines, Revised Edition, xviii + 346p, Springer-Verlag, 2001.
- 149 (C. de Boor) What is the inverse of a basis?, *BIT* **41(5)** (2001), 880–890.
- 150 (C. de Boor) A Leibniz formula for multivariate divided differences, SIAM J. Numer. Anal. 41(3) (2003), 856–868.

- 151 (C. de Boor) A divided difference expansion of a divided difference, J. Approx. Theory 122(1) (2003), 10–12. Publisher's Erratum: J. Approx. Theory, 124, 2003, 137.
- 152 (C. de Boor and A. Pinkus) The B-spline recurrence relations of Chakalov and of Popoviciu, J. Approx. Theory **124(1)** (2003), 115–123.
- 153 (C. de Boor) An asymptotic expansion for the error in a linear map that reproduces polynomials of a certain order, J. Approx. Theory **134** (2005), 171–174.
- 154 (C. de Boor) On interpolation by radial polynomials, Advances in Comp. Math. 24 (2006), 143–153.
- 155 (C. de Boor) Interpolation from spaces spanned by monomials, Advances in Comp. Math. 26(1-3) (2007), 63–70.
- 156 (C. de Boor) An efficient definition of the divided difference, in "Approximation Theory: A Volume Dedicated to Borislav Bojanov", (D. K. Dimitrov, G. Nikolov, and R. Uluchev, eds), Marin Drinov Academic Publ. House, 2004, 58–63.
- 157 (C. de Boor) Ideal interpolation, in "Approximation Theory XI: Gatlinburg 2004",
 (C. K. Chui, M. Neamtu, and L. L. Schumaker, eds), Nashboro Press, 2005, 59–91.
- 158 (C. de Boor) Divided differences, Surveys in Approx. Theory 1 (2005), 49-63.
- 159 (C. de Boor) Ideal interpolation: Mourrain's condition vs D-invariance, in "Banach Center Publications Vol. 72: Approximation and Probability", (Tadeusz Figiel and Anna Kamont, eds), IMPAN, 2006, 49–55.
- 160 (C. de Boor and A. Ron) Box splines revisited: convergence and acceleration methods for the subdivision and the cascade algorithms, *J. Approx. Theory* **150(1)** (2008), 1–23.
- 161 (C. de Boor) What are the limits of Lagrange projectors?, in "Constructive Theory of Functions, Varna 2005", (B. D. Bojanov, ed), Marin Drinov Acad. Publ. House, 2006, 51–63.
- 162 (C. de Boor) Multivariate polynomial interpolation: conjectures concerning GC-sets, Numer. Algorithms 45 (2007), 113–125.
- 163 (C. de Boor and B. Shekhtman) On the pointwise limits of bivariate Lagrange projectors, *Linear Algebra Appl.* **429(1)** (2008), 311–325.
- 164 (C. de Boor) Multivariate polynomial interpolation: Aitken-Neville sets and generalized principal lattices, J. Approx. Theory **161(1)** (2009), 411–420.
- 165 (C. de Boor and Tomas Sauer) "Multivariate polynomial interpolation", Surveys in Approx. Theory, xx.201x; xxx-xxx;
- 166 (D. Stahl and C. de Boor) On Radon's recipe for choosing correct sites for multivariate polynomial interpolation, *J. Approx. Theory* **163(12)** (2011), 1854–1858.
- 167 (Carl de Boor) On the (bi)infinite case of Shadrin's theorem concerning the L_{∞} boundedness of the L_2 -spline projector, *Trudy Instituta Matematiki i Mekhaniki UrO RAN* **17(3)** (2011), 25–29.
- 168 (Carl de Boor) A comment on Ewald Quak's "About B-splines", J. Numer. Anal. Approx. Theory 45(1) (2016), 84–86.

Editorial work

Editorial boards: J. Approximation Theory (1975–82, 90–), SIAM J. Numer. Anal. (1975–81), Math. Comp. (1977–82), Constructive Approximation (1984–), Approximation Theory Appl. (1984–), SIAM J. Math. Anal. (1988–99), Numer. Math. (1991–2010), Acta Numerica

(1991–2008), AT-NET (Approximation Theory Network) (1992–1996), Proc. NAS (2003–2004), HAT (History of Approximation Theory) (2002–), SAT (Surveys in Approximation Theory) (2005–).

editor, Mathematical Aspects of Finite Elements in Partial Differential Equations, Academic Press, 1974.

co-editor (with G. H. Golub), *Recent Advances in Numerical Analysis*, Academic Press, 1978.

program coordinator and speaker at the Research Initiation Workshop, Atlanta University Center, Aug. 17–19, 1980.

organizer of short course "Survey of Approximation Theory", Jan. 5–6, 1986, for the annual meeting of the Amer. Math. Soc. at New Orleans.

editor, *Approximation Theory*, Vol.36, Proceedings of Symposia in Applied Mathematics, Amer. Math. Soc., Providence RI, 1986.

http://books.google.ca/books?id=jceNPtrJN8kC&dq=%22Carl+de+Boor%22
&printsec=frontcover&source=bl&ots=H1gnI6FTEK&sig=

9DklhKVGVC9swepY5sgLBKupL4w&hl=en&ei=68X0SpLLFpCMMdG14egF&sa=X&oi= book_result&ct=result&resnum=4&ved=0CBYQ6AEwAw#v=onepage&q=&f=false

organizer of, and one of four speakers at, day course "Extension of B-spline curve algorithms to surfaces", Aug. 19, 1986, for SIGGRAPH'86 in Dallas TX, Aug.18–22.

editor, *I.J. Schoenberg, Selected Papers*, two volumes, Birkhäuser, Boston, 1988. http://books.google.ca/books?id=8x_5gafHZbQC&dq=%22Carl+de+Boor%22 &printsec=frontcover&source=bl&ots=58EpW37_eb&sig=

nE9b72fCQHB3xcMRfeKRjd9YC_g&hl=en&ei=68X0SpLLFpCMMdG14egF&sa=X

&oi=book_result&ct=result&resnum=7&ved=0CB0Q6AEwBg#v=onepage&q=&f=false

article Cardinal Splines in I.J. Schoenberg, Selected Papers, Vol.2, Birkhäuser, 1988, 164–166.

article The variational approach to splines in I.J. Schoenberg, Selected Papers, Vol.2, Birkhäuser, 1988, 428–430.

Organizer (with R.A. DeVore) of meeting 'Konstruktive Approximation' at Oberwolfach, West Germany, July 31-Aug.4, 1989

Organizer (with R.A. DeVore) of meeting 'Konstruktive Approximation' at Oberwolfach, Germany, 8-15 Aug, 1993

article Box Splines in Encyclopedia of Mathematics, Supplement I, R. Hoksbergen (ed), Kluwer, 1997, xxx–xxx.

Organizer (with R.E. Barnhill and J. Hoschek) of meeting 'Freiformkurven und Freiform-flächen' at Oberwolfach, Germany, 7-13 June 1998

article Numerical Analysis in McGraw-Hill Encyclopedia of Science & Technology, 5th ed., 1981, 376–380; 8th Edition, 1993, xxx–xxx; 9th Edition, 1999, xxx–xxx.

article Bernstein-Bézier form in Encyclopedia of Mathematics, Supplement III, Rob Hazewinkel (ed.), Kluwer, 2000, 68–69. (with Richard Askey), In Memoriam I.J. Schoenberg, J. Approx. Theory; 63; 1990; 1–2. I.J. Schoenberg obituary, Siam News, 2001.

(with Joseph Jerome), Michael Golomb professional biography, SIAM J. Math. Anal.; 13; 1983; v–xiv.

Chapter 6: *Spline Basics* in *Handbook of CAGD*, G. Farin, J. Hoschek (eds.), Elsevier Scientific B.V., 2002, pp. 141–166.

Commentary on "The numerically stable reconstruction of a Jacobi matrix from spectral data", in (Milestones in Matrix Computations, The selected works of Gene H. Golub, with commentaries), Raymond H. Chan, Chen Greif and Dianne O'Leary (eds.), Oxford University Press (Oxford, England), 2007, p. 546.

(with Christian Gout, Angela Kunoth, Christophe Rabut), Multivariate Approximation: Theory and Applications An Overview, Numer. Algorithms; 48; 2008; 1–9.

The way things were in multivariate splines: A personal view, in (Multiscale, Nonlinear and Adaptive Approximation), Ronald A. DeVore and Angela Kunoth (eds.), Springer Verlag (Heidelberg); 2009; pp. 19–37;

SIAM Fellows Selection Committee, member 2010–2011, chair 2011–2012.

Ph.D. Students

Steven A. Pruess, Estimating the eigenvalues of Sturm-Liouville problems by approximating the differential equation, Purdue University, 1970

David S. Dodson, Optimal order approximation by polynomial spline functions, Purdue University, 1972

Rong-qing Jia, Spline interpolation and some related topics, University of Wisconsin-Madison, 1983

Daniel Tien-you Lee, Some problems in cardinal spline interpolation and approximation, University of Wisconsin-Madison, 1984

Thomas A. Grandine, Computing with multivariate simplex splines, University of Wisconsin, 1985.

Jörg Peters, Fitting smooth parametric surfaces to 3D data, University of Wisconsin, 1990.

Thomas James Kunkle, A multivariate interpolant with nth derivatives not much larger than necessary, University of Wisconsin, 1991.

Kang Zhao, Approximation from principal shift-invariant spaces, University of Wisconsin, 1993.

Shayne Waldron, L_2 -error bounds for multivariate polynomial interpolation schemes, University of Wisconsin, 1995.

Scott Kersey, A minimizing spline curve under near-interpolatory constraints, University of Wisconsin, 1999.

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