CURRICULUM VITAE AND RESEARCH

J. KOREVAAR

Part I. General Information

1. Biographical Data

NAME: Jacob (Jaap) Korevaar

DATE OF BIRTH: January 25, 1923

PLACE OF BIRTH: Lange Ruige Weide (now part of Reeuwijk), The Netherlands

CITIZENSHIP: Naturalized U.S. citizen (1959)

MARRIAGES: (1950–1970) married to Johanna Elzelina Ladestein, now Johanna Thompson,

(1971–2010) married to Dr. Pia Rosa Pfluger†

CHILDREN: (first marriage) Wilhelmina (1952), Nicholas (1954), Albert (1956), Eric (1959), David (1962);

(second marriage) Karina (1973), Marc (1975), Jacqueline (1977);

cf. the personal information in Section 5.

HOME ADDRESS: Mecklenburglaan 25, 1404 BE Bussum, The Netherlands

BUSINESS ADDRESS: KdV Institute for Mathematics, University of Amsterdam, Science Park 904, Postbus 94248, 1090 GE Amsterdam, The Netherlands

2. Education

SECONDARY: Municipal H.B.S. Dordrecht, 1935–40

HIGHER: Universities of Leiden and Utrecht, 1940–49 (with war-time interruptions)

Date: July 23, 2014.

Mathematics, Physics and Astronomy: candidate, Utrecht, end of 1942;

Mathematics and Physics: drs, Leiden, 1947;

Mathematics: Ph.D., Leiden, 1949;

Title of Thesis: Approximation and Interpolation Applied to Entire Functions;

Ph.D. advisor: H.D. Kloosterman.

3. Career

REGULAR PROFESSORSHIPS (Mathematics)

Technische Hogeschool (Technical University) Delft, 1951–Jan. 53;

University of Wisconsin, Madison, Feb. 1953–64; Chairman, Program in Applied Mathematics and Engineering Physics, 1956–61; Associate (and/or Acting) Chairman, Dept of Mathematics, 1962–64;

University of California San Diego (La Jolla), 1964–74; Chairman, Dept of Mathematics, 1971–73;

University of Amsterdam, 1974–(Jan.) 93; Director, Math. Institute, 1980–83; Professor Emeritus, 1993–.

TEMPORARY and VISITING POSITIONS

Mathematical Center (now CWI), Amsterdam, research associate 1947–49;

Purdue University, visiting lecturer 1949–50, visiting assistant professor 1950–51;

University of Michigan (Ann Arbor), Summer 1950;

Stanford University, Academic year 1961–62 and several summers, most recently 1969;

Claremont Graduate School, Sep. 1969–Jan. 1970;

University of Oregon, Summer 1970;

Imperial College, London, Academic year 1970–71;

Technical University Eindhoven, Summer 1971;

California Institute of Technology, Spring 1988;

Bar-Ilan University (Israel), Spring 1992.

4. Memberships and Assignments

WISKUNDIG GENOOTSCHAP (Netherlands' Mathematical Society), 1942–; chairman 1982–84; honorary member 1998–;
AMERICAN MATHEMATICAL SOCIETY, 1949–; chairman, AMS Summer Research Institute on 'Entire functions and related parts of analysis', La Jolla, 1966; honorary member 1993–; fellow 2012–;
MATHEMATICAL ASSOCIATION OF AMERICA, 1953–; Lester R. Ford Prize (1987) and Chauvenet Prize (1989) for mathematical exposition;
KNAW (Royal Netherlands' Academy of Arts and Sciences), elected foreign correspondent 1959; elected member 1975; coordinating editor, Indagationes Mathematicae, 1984–98 (with an interruption to serve as chairman of the Dutch Government's 'Verkenningscommissie voor Wiskunde', 1989–92); chairman, Mathematics Section, 1994–96.

OTHER HONORS and SPECIAL ASSIGNMENTS
Reynolds' award 'for outstanding teaching of future engineers', Univ. of Wisconsin, 1956;
Fellow Amer. Assoc. Adv. Science, 1961–;
HONORARY DOCTOR, University of Gothenburg (Sweden), 1978;
Initiated exchange agreement in Mathematics between the Amsterdam Institutions and the Steklov Mathematical Institutes (Moscow, Leningrad) of the Soviet Academy of Sciences, 1988;
Chairman, Visiting Committee for Mathematics in Flanders, 1995–96.

LECTURES at Meetings/Conferences/Universities:
Some 400 talks in various countries, among them many in Eastern Europe
Co-editor of several mathematical journals and of conference proceedings at one time or another

5. Jaap Korevaar's Family

PARENTS. Jaap's father Nijs (1896) was the eldest son of farmer Jacob Korevaar at Molenaarsgraaf who was active in church and community (school and water district). Son Nijs briefly tried farming but did not like it. Interested in mathematics and other academic subjects, his parents gave him permission to become a teacher. He served as a school principal in a number of villages in the province of Zuid-Holland. Jaap showed an early interest in numbers, which was stimulated by his father. His mother Cornelia Agatha (1897) was the youngest daughter of B.M. Wepster, a well-known school principal in Hendrik Ido Ambacht, and E.A. Lancel, a teacher. Cornelia had musical talent and studied piano for a number of years. However, following the wish of her father, she became a teacher like her eldest brother and her sisters.

BROTHERS. Jaap (1923) is the eldest of the four Korevaar–Wepster children (all boys). Of his brothers, Bert (1925) became professor of materials science at Delft, while Nijs (1927), another Delft engineer, became a businessman in Switzerland. Continuing a different Wepster tradition, Kees (1934) became an officer in the merchant marine, but later had a career at the KNMI (Royal Netherlands' Meteorological Institute).

SPOUSE. Jaap's second spouse Pia was a numerical analyst, but had broad interests outside mathematics, including music. Her father Albert Pfluger was a well-known mathematician at the ETH, Zürich, her mother Maria Jeger was a teacher of English.

CHILDREN. The five children of the first marriage live in the United States.

Daughter Wilhelmina (1952) trained as an anaesthesiologist (UC Berkeley, UC San Diego, Yale) and later specialized in the treatment of pain. She practiced in Philadelphia. Wilma and husband R.W. (Bob) Pearson (Univ of Pennsylvania) retired in 2012 and moved to Cape May.

Son Nicholas (1954) studied mathematics (Harvard, Stanford) and is now a professor at the University of Utah.
Son Albert (1956) is severely handicapped and now institutionalized in Arkansas.
Son Eric (1959) trained as an applied physicist (Cal. Tech., Princeton). He started, developed and finally sold a successful company in the area of laser communication. He lives in La Jolla, CA; present company The Science Artist.
Son David (1962) is a classical pianist (Juilliard School, New York) and now a professor of music at the University of Colorado (Boulder).

The three children of the present marriage live in The Netherlands.
Daughter Karina (1973) studied violin at Utrecht, Amsterdam and Berlin. Living in Hilversum (where she served with the Radio Philharmonic Orchestra) she now is a violinist with the Netherlands' Philharmonic Orchestra (Amsterdam).
Son Marc (1975) studied experimental physics at Utrecht, obtained a PhD at TUDelft and now works for a company at Delft.
Daughter Jacqueline (1977) studied Russian (Amsterdam) and the Theater (Maastricht); she lives in Amsterdam.

HOBBIES. Besides mathematics, Korevaar's hobbies include hiking, foreign languages and listening to classical music.

Part II. Research Work

6. Introduction

Korevaar's research broadly falls into the areas of COMPLEX ANALYSIS and APPROXIMATION THEORY.
Here complex analysis includes *classical function theory* and aspects of *several complex variables*, as well as the related area of *potential theory*.

The approximation theory includes *complex approximation*, *Fourier analysis*, *Tauberian theory* and *quadrature theory*.
Special areas are the theory of *distributions* or generalized functions and (more recently) the theory of *prime pairs*.
Numbers in brackets refer to the list of publications.

BEGINNINGS. Stimulated by his secondary school teacher of mathematics (later professor) C. Visser in Dordrecht and by lecturer (later professor) H.D. Kloosterman at Leiden, Korevaar developed an early interest in Tauberian theory. Having to spend a number of war years 1940–45 at home or in hiding, he studied work of Hardy, Littlewood, Pólya, F. Riesz, Szegő and Wiener. Influenced also by his lifelong friends (later professors) Fred van der Blij and Dick (N.G.) de Bruijn, he solved many of the Wiskundige Opgaven (Mathematical Problems) published by the Netherlands' Mathematical Society. Considering the limited range of topics taught in the universities before 1947, work on these Problems had a salutary broadening effect.
Korevaar wrote his Ph.D. thesis at the Mathematisch Centrum (Mathematical Center) in Amsterdam. There, van der Blij and he, the first research associates actually on the spot (1947), were doing a good deal of leg work as well as a certain amount of teaching (evening courses). Stimulated by mathematical developments which they picked up from the newly arriving literature, they organized a series of survey lectures under the title 'Actualiteiten'. Cf. the book 'Zij mogen uiteraard daarbij de zuivere wiskunde niet vergeten' [Dutch, from the mission statement of the Mathematical Center: 'In this, they should of course not ignore pure mathematics'], (G. Alberts, F. van der Blij, J. Nuis, eds), CWI Tracts, Amsterdam, 1987, in particular pp 161–171.

The surveys also presented them with topics for research. Thus, a question by de Bruijn and survey [6d] were the beginning of Korevaar's thesis [10], which involves entire functions and complex approximation.

Earlier publications of Korevaar on real approximation were motivated by Tauberian questions and Müntz-type or lacunary polynomial approximation. The frequently quoted note on 'slowly oscillating functions' (now called slowly varying functions) with van Aardenne-Ehrenfest and de Bruijn [9] was also motivated by Tauberian questions. Interaction with de Bruijn would continue for many years; cf. the paper [120] devoted to the latter's work in analysis.

A visit to the Mathematical Center by Paul Erdős (Fall 1948), in connection with his and Selberg's surprising 'elementary proof' of the prime number theorem, ultimately led K. to a series of Tauberian papers; cf. Section 8.

INTERACTION WITH TEACHING. Throughout his career, Korevaar has devoted much time to teaching and the preparation of elaborate lecture notes; see [27c], [42a], [70a], [81b], [81c], [90a]. His courses in the U.S. on 'Mathematical Methods', primarily for graduate students in physics and engineering, occasionally drew over a hundred students. Some of his research was directly motivated by the teaching, which led to his books [45], [116]; cf. Section 9.

7. Complex Analysis

As mentioned already, Korevaar's Ph.D. thesis was in the area of *entire functions and complex approximation*. These subjects would remain a principal theme in Korevaar's own research as well as in joint work with his students and others. Here one may mention the papers [13], [18], [32] (this one with Gerry Hedstrom), [33] (with Si Hellerstein), [37] (with Tom McCoy), [39] (with John Lange) and the survey [43]. Greater refinement came with his article in the Annals of Mathematics: 'Asymptotically neutral distributions of electrons and polynomial approximation' [40]. This paper marks the beginning of Korevaar's fascination with electrostatic fields, due to distributions of unit point charges. In particular, can one explain a precise Faraday cage effect of electrostatics on this basis? Cf. the papers [48] (with Tunc Geveci), [49], [70] (this one with Ronald Kortram) and [91], [99] (both with Monterie).

After returning to the Netherlands in 1974, Korevaar initiated work in *multidimensional complex analysis* in Amsterdam. There was a first paper with Jan Wiegerinck and Rein Zeinstra on areas of zero sets [68]. Together with Wiegerinck, Korevaar obtained a real-variable 'Lemma on the estimation of mixed derivatives in terms of directional derivatives', which has found a number of applications [71], [72], [74]. In the end, complex potential theory provided a natural setting for this work; see [76]–[78], [80], [81].

By himself and with coauthors, Korevaar investigated *Chebyshev-type quadratures*, cf. [82], [90], and [84]–[86] (the latter with Jan Meyers). The problem here is to obtain numerical integration formulas in which all nodes receive the same weight: integrals are approximated by arithmetic means of function values. A special challenge was provided by integration over a sphere; see below. Good sets of Chebyshev nodes on the sphere correspond to locations for sets of electrons, for which the electrostatic field is extremely small well inside the sphere. Complex potential theory also has something to say about this problem, cf. the survey [87] (lecture notes prepared with the assistance of Arno Kuijlaars). It turned out later that algebraic curves and surfaces can be characterized by a typical high degree of accuracy of Chebyshev quadrature; see [94] (with Len Bos) and [95].

Another unexpected by-product of the quadrature studies was a 'three-balls theorem' for harmonic functions (in two or more variables), reminiscent of Hadamard's three-circles theorem for analytic functions in the plane. See [83] (with Jan Meyers).

It was long an open problem how many nodes would be required for a Chebyshev quadrature formula on the d-dimensional unit sphere that is accurate for all polynomials of degree n. Here Korevaar and Meyers had conjectured that there is a constant $c = c_d$ such that $\leq c_d n^d$ nodes will suffice; cf. Report [102]. The conjecture was recently proved by Bondarenko, Radchenko and Viazovska; see their paper "Optimal asymptotic bounds for spherical designs", Ann. of Math. (2) **178**, 443-452.

8. Approximation Theory

There are several papers involving Müntz-type approximation, approximation by polynomials involving only a limited set of monomials. The problem for a real interval [6] was later treated by a complex method [47] (with Wim Luxemburg). Other papers deal with approximation on curves by Müntz-type or other special polynomials. The list includes [35] (with Loewner), [50], [51] (this one with Pia Pfluger), [53] (with Herb Alexander), [55] and [57]–[60] (all with Michael Dixon), and [75] (with Rein Zeinstra).

With Si Hellerstein, Korevaar had already pioneered Müntz-type approximation in several real variables [44]. After K's presentation at the 1966 Moscow International Congress of Mathematicians, this work stimulated Ronkin in Kharkov to develop a more fundamental approach involving multidimensional complex analysis. There is a survey in [69] (with contributions by Rein Zeinstra and Jan Wiegerinck).

Various expository papers have dealt with polynomial and rational approximation in the complex domain [63], the spanning radius for a set of complex exponentials [64], Newman's ingenious complex method for the prime number theorem [67], and de Branges' surprising proof of the Bieberbach conjecture for one-to-one analytic functions [73]. Here

Korevaar's article received recognition in the form of prizes by the Mathematical Association of America.

TAUBERIAN THEORY. Given that an infinite series is summable by a certain strong method, can one give conditions under which it is summable by a weaker method, or even convergent? Knowing the order of the approximation under a stronger method, one may ask for the remainder under a weaker method. A question by Erdős ultimately led to a series of papers on Tauberian remainder estimates [14], [17], [19]–[21], [23], [24]; cf. also [36], [97] and [98]. Paper [100] contains an application of a Tauberian method to the growth of lacunary power series. Complex Tauberian theory, where one imposes conditions in the complex domain, was the subject of the survey [103].

TAUBERIAN BOOK. In 2004 Korevaar published a comprehensive book 'Tauberian Theory' in Springer's Grundlehren Series, with subtitle 'A century of developments' [105]. It was reprinted in China in 2006.

The book contains several proofs of the prime number theorem; cf. also [107]. Alone or with others, Korevaar has written a number of papers on prime pairs; see [109, 110, 111, 114, 115, 117].

A very different aspect of summability theory plays a role in article [96], on the winding number of circle maps.

9. Distributions

At the 1950 International Congress of Mathematicians (Cambridge, Mass.), Laurent Schwartz received a Fields medal for his Theory of Distributions (generalized functions). Stimulated by his lecture and a subsequent seminar at Purdue University initiated by Michael Golomb, Korevaar developed an elementary approach to distributions; see the papers [25–28], and compare the books [45], [116] and the lecture notes

[81b]. At the University of Wisconsin he used this treatment of distributions in his teaching of advanced students in physics and engineering (resulting in a 1956 teaching award). More theoretical are the paper 'Pansions and the theory of Fourier transforms' [29] (later noted by Dick de Bruijn in his work on Wigner distributions), and the frequently quoted article [34]: 'Distribution proof of Wiener's Tauberian theorem'.

10. Ph.D. Students

Robert K. Meany, Differential equations for sequences. Univ. of Wisconsin, Madison, 1958

Gerald W. Hedstrom, Absolute convergence of eigenfunction expansions. Univ. of Wisconsin, 1959

John E. Lange, Entire functions as limits of zero-restricted polynomials. Univ. of Wisconsin, 1961

Thomas L. McCoy, Entire functions with restraints on the zeros of the partial sums. Univ. of Wisconsin, 1961

Maynard D. Thompson, Approximation by polynomials whose zeros lie on a curve. Univ. of Wisconsin, 1962

Gilbert G. Walter, Expansions of distributions. Univ. of Wisconsin, 1962

Leon Nower, On division of distributions by polynomials. Stanford Univ., 1965

Judith Molinar Elkins, Approximation by polynomials with restricted zeros. Univ. of Wisconsin, 1966

Charles K. Chui, Bounded approximation by polynomials with restricted zeros. Univ. of Wisconsin, 1967

Donald T. Piele, Approximation of harmonic functions by potentials of unit charges. Univ. of California San Diego, La Jolla, 1970

Michael J. Dixon, Approximation by lacunary polynomials, Univ. of California San Diego, La Jolla, 1975

J.J.O.O. Wiegerinck, Entire functions of Paley-Wiener type in $\mathbb{C}^n$, Radon transforms and problems of holomorphic extension. Univ. of Amsterdam, 1985

R.L. Zeinstra, Some problems concerning zero sets of analytic functions of one and several variables. Univ. of Amsterdam, 1985

R.G.M. Brummelhuis, Variations on a theme of Frederic and Marcel Riesz. Univ. of Amsterdam, 1988

J.L.H. Meyers, Chebyshev-type quadrature formulas and potential theory. Univ. of Amsterdam, 1992

M.A. Monterie, Topics in potential theory. Free Univ. Amsterdam, 1994

11. Bibliography

1. Some entire functions, represented in a half-plane by Laplace integrals (Dutch). Mathematica B (Zutphen) **12** (1944), 107–114.

2. A theorem on uniform convergence. Nederl. Akad. Wetensch. Proc. **49** (1946), 752–757 = Indag. Math. **8** (1946), 455–460.

2a. A theorem on uniform approximation. Simon Stevin **25** (1946/47), 201–207. (Essentially a reprint of #2.)

3. The uniform approximation to continuous functions by linear aggregates of functions of a given set. Duke Math. J. **14** (1947), 31–50.

4. An elementary proof of a Tauberian theorem for Lambert series I, II (Dutch). Simon Stevin **25** (1946/47), 83–114.

5. An old proof of the prime number theorem revisited (Dutch). Handelingen, 30th Ned. Nat. en Gen. Congres, Delft, 1947, pp 108–109.

6. A characterization of the sub-manifold of $C[a, b]$ spanned by the sequence $\{x^{n_k}\}$. Nederl. Akad. Wetensch. Proc. **50** (1947), 750–758 = Indag. Math. **9** (1947), 360–368.

6a. The zeros of the derivatives of a function and its analytic character (Series Actualiteiten, Dutch). Report ZW 1948–004, Math. Centrum Amsterdam, 9 pp.

6b. (With B.L. van der Waerden) Evaporation into a turbulent atmosphere (Dutch). Report ZW 1948–06, Math. Centrum Amsterdam, 6 pp.

6c. Entire functions of exponential type (Series Actualiteiten, Dutch). Report ZW 1948–011, Math. Centrum Amsterdam, 10 pp.

6d. The zeros of polynomials converging to an entire function and its canonical representation (Series Actualiteiten, Dutch). Report ZW 1948–017, Math. Centrum Amsterdam, 18 pp.

6e. Interpolatory methods applied to functions of exponential type (Dutch). Report ZW 1948–018, Math. Centrum Amsterdam, 16 pp.

7. A simple proof of a theorem of Pólya. Simon Stevin **26** (1948/49), 81–89.

8. An inequality for entire functions of exponential type. Nieuw Arch. Wiskunde (2) **23** (1949), 55–62.

9. (With T. van Aardenne-Ehrenfest and N.G. de Bruijn) A note on slowly oscillating functions. Nieuw Arch. Wiskunde (2) **23** (1949), 77–86.

9a. (With P.A.J. Scheelbeek) Inversion of a matrix (Dutch). Report ZTW 1949–01, Math. Centrum Amsterdam, 5 pp.

10. Approximation and interpolation applied to entire functions. Ph.D. thesis, Univ. of Leiden. Drukkerij Holland, Amsterdam, 1949.

11. Functions of exponential type bounded on sequences of points. Ann. Soc. Polon. Math. **22** (1949), 207–234.

12. Functions with only monotonic derivatives (Dutch). Handelingen, 31st Ned. Nat. en Gen. Congres, Groningen, 1949, pp 88–89.

12a. (With M. Golomb) On the zeros and asymptotic behavior of Bessel functions. Preprint, Math. Dept, Purdue University, 1950.

12b. (Lecture notes) Normed linear spaces. Nine one-hour lectures. Math. Dept, Purdue University, 1950.

13. The zeros of approximating polynomials and the canonical representation of an entire function. Duke Math. J. **18** (1951), 573–592.

14. An estimate of the error in Tauberian theorems for power series. Duke Math. J. **18** (1951), 723–734.

15. The concept of function and applied mathematics (Dutch). Inaugural lecture, Techn. Hogeschool Delft. Noordhoff, Groningen, 1951, 15 pp.

16. Tauberian theorems. Simon Stevin **30** (1953), 129–139.

17. Best L^1 approximation and the remainder in Littlewood's theorem. Nederl. Akad. Wetensch. Proc. Ser. A **56** (1953), 281–293 = Indag. Math. **15** (1953), 281–293.

18a. Entire functions as limits of polynomials. In: Lectures on Functions of a Complex Variable (W. Kaplan, ed.), Univ. of Michigan 1953. Ann Arbor, Mich., 1955, pp 421–423. (Concise version of #18.)

18. Entire functions as limits of polynomials. Duke Math. J. **21** (1954), 533–548.

19. A very general form of Littlewood's theorem. Nederl. Akad. Wetensch. Proc. Ser. A **57** = Indag. Math. **16** (1954), 36–45.

20. Another numerical Tauberian theorem for power series. Nederl. Akad. Wetensch. Proc. Ser. A **57** (1954) = Indag. Math. **16** (1954), 46–56.

21. Numerical Tauberian theorems for Dirichlet and Lambert series. Nederl. Akad. Wetensch. Proc. Ser. A **57** = Indag. Math. **16** (1954), 152–160.

22. Kloosterman's method in Tauberian theorems for (C, k) summability. Proc. Amer. Math. Soc. **5** (1954), 574–577.

23. Numerical Tauberian theorems for power series and Dirichlet series. I, II. Nederl. Akad. Wetensch. Proc. Ser. A **57** = Indag. Math. **16** (1954), 432–443, 444–455.

24. The Riemann hypothesis and numerical Tauberian theorems for Lambert series. Nederl. Akad. Wetensch. Proc. Ser. A **57** = Indag. Math. **16** (1954), 564–571.

25. Distributions defined from the point of view of applied mathematics. I. Fundamental sequences. II. Derivatives and antiderivatives, Laplace transformation. Nederl. Akad. Wetensch. Proc. Ser. A **58** = Indag. Math. **17** (1955), 368–378, 379–389.

26. Distributions defined by fundamental sequences. III. Convergence. Convolution. Definite integral. Inverse Laplace transformation. IV. Multiplication and division. Substitution. Nederl. Akad. Wetensch. Proc. Ser. A **58** = Indag. Math. **17** (1955), 483–493, 494–503.

27. Distributions defined by fundamental sequences. V. Integral of a product. Fourier series. Connection with Schwartz's theory. Nederl. Akad. Wetensch. Proc. Ser. A **58** = Indag. Math. **17** (1955), 663–674.

27a. (Book essay) Entire Functions, by R.P. Boas, Jr. [Acad. Press, New York, 1954]. In: Bull. Amer. Math. Soc. **62** (1956), 57–62.

27b. Notes on differential equations I, Analog of a nonlinear Tauberian theorem of Erdős. Abstract, Bull. Amer. Math. Soc. **62** (1956), 42.

27c. (Lecture notes) Mathematical methods in physics and engineering. Dept of Math., Univ. of Wisconsin, 1956 and subsequent revisions.

28. Fourier transforms of generalized functions. In: Symposium on Harmonic Analysis and Related Integral Transforms, Cornell University 1956 (H. Pollard, ed.). Ithaca, N.Y., 1957, 43 pp.

29. Pansions and the theory of Fourier transforms. Trans. Amer. Math. Soc. **91** (1959), 53–101.

29a. (Book review) Integral Functions, by M.L. Cartwright [Cambridge Univ. Press, 1956]. In: Bull. Amer. Math. Soc. **67** (1961), 454–455.

30. Approximation by polynomials whose zeros lie on a circle. Nieuw Arch. Wiskunde (3) **10** (1962), 11–16.

31. Limits of polynomials with restricted zeros. In: Studies in Math. Analysis and Related Topics – Essays in honor of G. Pólya (D. Gilbarg et al., eds.). Stanford, Calif., 1962, pp 183–190.

32. (With G.W. Hedstrom) The zeros of the partial sums of certain small entire functions. Duke Math. J. **30** (1963), 519–532.

33. (With S. Hellerstein) Limits of entire functions whose growth and zeros are restricted. Duke Math. J. **30** (1963), 221–228.

34. Distribution proof of Wiener's Tauberian theorem. Proc. Amer. Math. Soc. **16** (1965), 353–355.

35. (With C. Loewner) Approximation on an arc by polynomials with restricted zeros. Nederl. Akad. Wetensch. Proc. Ser. A **67** = Indag. Math. **26** (1964), 121–128.

36. Square roots relative to convolution. J. Analyse Math. **10** (1963), 363–379.

37. (With T.L. McCoy) Power series whose partial sums have few zeros in an angle. J. Math. Anal. Appl. **8** (1964), 461–473.

38. (With P.M. Anselone) Translation invariant subspaces of finite dimension. Proc. Amer. Math. Soc. **15** (1964), 747–752.

39. (With J.E. Lange) Limits of polynomials whose zeros lie in a radial set. Trans. Amer. Math. Soc. **114** (1965), 65–79.

40. Asymptotically neutral distributions of electrons and polynomial approximation. Ann. of Math. (2) **80** (1964), 403–410.

41a. (PROCEEDINGS) On Approximation Theory (P.L. Butzer and J. Korevaar, eds.). Internat. Ser. Numer. Math. vol. 5, Birkhäuser, Basel, 1964, xvi+261 pp.

41. Approximation by polynomials whose zeros lie in a given set. In: On Approximation Theory, Oberwolfach 1963 (P.L. Butzer and J. Korevaar, eds.). Birkhäuser, Basel, 1964, pp 161–171.

42. (With S. Hellerstein) The real values of an entire function. Bull. Amer. Math. Soc. **70** (1964), 608–610.

42a. (Lecture notes) Mathematical methods, 2 volumes. Dept of Math., Univ. of California San Diego, 1965 and subsequent revisions.

43a. (PROCEEDINGS, 1966 AMS Summer Research Institute) Entire functions and related parts of analysis. Edited by J. Korevaar (coordinating editor), S.S. Chern, L. Ehrenpreis, W.H.J. Fuchs and L.A. Rubel. Proc. Sympos. Pure Math., vol. 11. Amer. Math. Soc., Providence, R.I. 1968, vi+554 pp.

43. Limits of polynomials whose zeros lie in a given set. In: Entire Functions and Related Parts of Analysis, La Jolla 1966 (J. Korevaar et al., eds.). Proc. Sympos. Pure Math., vol. 11, Amer. Math. Soc., Providence, R.I., 1968, pp 261–272.

44a. (With S. Hellerstein) Discrete sets of uniqueness for bounded holomorphic functions $f(z,w)$. Preprint, Math. Dept, UCSD, 1966. (More geometric form of #44).

44. (With S. Hellerstein) Discrete sets of uniqueness for bounded holomorphic functions $f(z,w)$. In: Entire Functions and Related Parts of Analysis, La Jolla 1966 (J. Korevaar et al., eds.). Proc. Sympos. Pure Math., vol. 11, Amer. Math. Soc., Providence, R.I., 1968, pp 273–284.

45. (BOOK) Mathematical Methods. Vol. I, Linear Algebra, Normed Spaces, Distributions, Integration. Academic Press, New York, 1968, x+505 pp. Reprinted by Dover Publ. 1996.

45a. (Book review) Mathematics for the physical sciences, by Laurent Schwartz [Addison-Wesley, Reading, Mass, 1966]. In: SIAM Review **10** (1968), 233–234.

46. (With C.K. Chui) Potentials of families of unit masses on disjoint Jordan curves. In: Abstract Spaces and Approximation, Oberwolfach 1968 (P.L. Butzer and B. Sz.-Nagy, eds.). Internat. Ser. Numer. Math. vol. 10, Birkhäuser, Basel, 1969, pp 338–350.

46a. Poor approximability and high-index Tauberians. Abstract, Notices Amer. Math. Soc. **17** (1970), 182.

47. (With W.A.J. Luxemburg) Entire functions and Müntz–Szász type approximation. Trans. Amer. Math. Soc. **157** (1971), 23–37.

48. (With T. Geveci) Fields due to electrons on an analytic curve. SIAM J. Math. Anal. **2** (1971), 445–453.

48a. (Book review) Generalized integral transformations, by A.H. Zemanian [Wiley, New York, 1968]. SIAM Review **15** (1973), 232–234.

49. Equilibrium distributions of electrons on roundish plane conductors I, II. Nederl. Akad. Wetensch. Proc. Ser. A **77** = Indag. Math. **36** (1974), 423–437, 438–456.

50. Approximation on curves by linear combinations of exponentials. In: Approximation Theory, Texas 1973 (G.G. Lorentz, ed.). Academic Press, New York, 1973, pp 387–393.

51. (With Pia Pfluger) Spanning sets of powers on wild Jordan curves. Nederl. Akad. Wetensch. Proc. Ser. A **77** = Indag. Math. **36** (1974), 293–305.

52. Commentary on the Tauberian-Theoretic Papers. In: Norbert Wiener, Collected Works, vol. II (P. Masani, ed.). M.I.T. Press, Cambridge, Mass., 1979, pp 628–635.

53. (With H. Alexander) Approximation on wild Jordan curves. J. London Math. Soc. (2) **13** (1976), 317–322.

53a. Problems of equilibrium points on the sphere and electrostatic fields. Math. Dept, Univ. of Amsterdam, Report 1976–03.

54. Lacunary forms of Walsh's approximation theorems. In: Theory of Approximation of Functions, Kaluga 1975 (S.B. Steckin et al., eds.). Izdat. Nauka, Moscow, 1977, pp 229–237.

55. (With M. Dixon) Approximation by lacunary polynomials. Nederl. Akad. Wetensch. Proc. Ser. A **80** = Indag. Math. **39** (1977), 176–194.

56a. (Obituary) Johannes Gualtherus van der Corput (Dutch). In: Nederl. Akad. Wetensch. Yearbook 1975. North-Holland, Amsterdam, 1976, pp 198–203.

56b. Commentary on: J.G. van der Corput's work On Exponential Sums and Lattice Points. In: Two decades of mathematics in the Netherlands, 1920–1940 (E.M.J. Bertin et al., eds.). Math. Center, Amsterdam, 1978, Part I, pp 35–40.

56c. (With H.J.A. Duparc et al.) Johannes Gualtherus van der Corput. Nieuw Arch. Wiskunde (3) **30** (1982), 1–39.

57. (With M. Dixon) Nonspanning sets of powers on curves: Analyticity theorem. Duke Math. J. **45** (1978), 543–559.

58. (With M. Dixon) Lacunary polynomial approximation. In: Linear Spaces and Approximation, Oberwolfach 1977 (P.L. Butzer et al., eds.). Birkhäuser, Basel, 1978, pp 479–489.

59. (With M. Dixon) Interpolation, strongly nonspanning powers and Macintyre exponents. Nederl. Akad. Wetensch. Proc. Ser. A **81** = Indag. Math. **40** (1978), 243–258.

60. (With M. Dixon) Nonspanning sets of exponentials on curves. Acta Math. Acad. Sci. Hung. **33** (1979), 89–100.

61a. (Obituary) John Edensor Littlewood. In: Nederl. Akad. Wetensch. Yearbook 1977. North-Holland, Amsterdam, 1978, pp 193–197.

62. Müntz approximation on arcs and Macintyre exponents. In: Complex Analysis Joensuu 1978 (I. Laine et al., eds.). Lect. Notes in Math. 747, Springer, Berlin, 1979, pp 205–218.

63. Polynomial and rational approximation in the complex domain. In: Aspects of Contemporary Complex Analysis, Durham 1979 (D.A. Brannan and J.G. Clunie, eds.). Academic Press, London, 1980, pp 251–292.

64. Zero distribution of entire functions and spanning radius for a set of complex exponentials. In: Aspects of Contemporary Complex Analysis, Durham 1979 (D.A. Brannan and J.G. Clunie, eds.). Academic Press, London, 1980, pp 293–312.

64a. (BOOK TRANSLATION) B. Ja. Levin, Distribution of zeros of entire functions. Translated from the Russian by R.P. Boas, J.M. Danskin, F.M. Goodspeed, J. Korevaar, A.L. Shields and H.P. Thielman. Revised edition. Transl. of Math. Monographs vol. 5. Amer. Math. Soc., Providence, R.I., 1980, xii+523 pp.

65. (With L. Bijvoets and W. Hogeveen) Inverse approximation theorems of Lebedev and Tamrazov. In: Functional Analysis and Approximation, Oberwolfach 1980 (P.L. Butzer et al., eds.). Birkhäuser, Basel, 1981, pp 265–281.

66. Approximation by polynomials and rational functions (Dutch). Nederl. Akad. Wetensch., Verslagen Afd. Natuurkunde **89** (1980), 98–103.

67. On Newman's quick way to the prime number theorem. Math. Intelligencer **4** (1982), 108–115.

68a. (With J. Wiegerinck and R. Zeinstra) Minimal area of zero sets in tube domains of $\mathbb{C}^2$. Preliminary version. In: Complex Analysis and Applications, Varna 1981 (L. Iliev et al., eds.). Sofia, 1984, pp 276–284.

68. (With J. Wiegerinck and R. Zeinstra) Minimal area of zero sets in tube domains of $\mathbb{C}^2$. Nederl. Akad. Wetensch. Proc. Ser. A **87** = Indag. Math. **46** (1984), 283–290.

69. (With contributions by R. Zeinstra and J. Wiegerinck) Müntz-type theorems for arcs and for $\mathbb{R}^n$. In: Second Edmonton Conf. on Approximation Theory, 1982 (Z. Ditzian et al., eds.). Canad. Math. Soc. Conf. Proc. vol. 3, Amer. Math. Soc., Providence, R.I., 1983, pp 199–225.

70. (With R.A. Kortram) Equilibrium distributions of electrons on smooth plane conductors. Nederl. Akad. Wetensch. Proc. Ser. A **86** = Indag. Math. **45** (1983), 203–219.

70a. (Lecture notes) Advanced complex analysis (Dutch; 'Voortgezette functietheorie'). Math. Institute, Univ. of Amsterdam, 1983.

71. (With J. Wiegerinck) A lemma on mixed derivatives with applications to edge-of-the-wedge, Radon transformation and a theorem of Forelli. (Symp. Arandjelovac 1984). Mat. Vesnik **37** (1985), 145–157.

71a. Adriaan Cornelis Zaanen. In: Anniversary Volume on Approximation Theory and Functional Analysis, Oberwolfach 1983 (P.L. Butzer et al., eds.). Internat. Ser. Numer. Math. vol. 65, Birkhäuser, Basel, 1984, pp 41–45.

72. (With J. Wiegerinck) A representation of mixed derivatives with an application to the edge-of-the-wedge theorem. Nederl. Akad. Wetensch. Proc. Ser. A **88** = Indag. Math. **47** (1985), 77–86.

73. Ludwig Bieberbach's conjecture and its proof by Louis de Branges. Amer. Math. Monthly **93** (1986), 505–514.

74. (With J. Wiegerinck) A lemma on mixed derivatives and results on holomorphic extension. Nederl. Akad. Wetensch. Proc. Ser. A **88** = Indag. Math. **47** (1985), 351–362.

75. (With R. Zeinstra) Transformées de Laplace pour les courbes à pente bornée et un résultat correspondant du type Müntz–Szász. C. R. Acad. Sci. Paris, Série I Math. **301** (1985), 695–698.

75a. News in the corner of complex analysis (Dutch). Nederl. Akad. Wetensch., Verslagen Afd. Natuurkunde **94** (1985), 33–38.

76. Polynomial approximation numbers, capacities and extended Green functions for $\mathbb{C}$ and $\mathbb{C}^N$. In: Approximation Theory V, Texas 1986 (C.K. Chui et al., eds.). Academic Press, New York, 1986, pp 97–127.

77. Green functions, capacities, polynomial approximation numbers and applications in real and complex analysis. Nieuw Arch. Wiskunde (4) **4** (1986), 133–153.

77a. Some $\mathbb{C}^N$ capacities and applications. In: Complex Analysis II, Proceedings, Univ. of Maryland 1985-86 (C.A. Berenstein, ed). Lect. Notes in Math. no. 1276, Springer, Berlin, 1987, pp 208–228.

78. Some $\mathbb{C}^N$ capacities and applications. The lemma on mixed derivatives revisited (Symposium Budva 1986). Mat. Vesnik **38** (1986), 495–506.

79. Interpolation by entire functions in $\mathbb{C}$, another look. In: Complex Analysis (J. Hersch and A. Huber, eds.). Birkhäuser, Basel, 1988, pp 131–137.

79a. (Book essay) Several complex variables: Range's recent book and other texts. Nieuw Arch. Wiskunde (4) **7** (1989), 83–89.

80. Partial derivatives lemma related to $\mathbb{C}^n$ potential theory and applications. In: Geometric function theory and applications of complex analysis, Halle 1988 (R. Kühnau and W. Tutschke, eds.). Pitman Research Notes in Math. 257, Longman, Harlow, 1991, pp 67–84.

81. Applications of $\mathbb{C}^n$ capacities. In: Several Complex Variables and Complex Geometry, Santa Cruz 1989 (E. Bedford et al., eds.). Proc. Sympos. Pure Math. vol. 52, Amer. Math. Soc., Providence, R.I., 1991. Part 1, pp 105–118.

81a. (Laudatio) The Ostrowski Prize for Louis de Branges. Nieuw Arch. Wiskunde (4) **9** (1991), 359–365.

81b. (Lecture notes) Fourier analysis and distributions. Math. Institute, Univ. of Amsterdam, revised 1991.

81c. (Lecture notes) Introduction to function theory in $\mathbb{C}^n$. Math. Institute, Univ. of Amsterdam, revised 1991.

82. Behavior of Cotes numbers and other constants, with an application to Chebyshev-type quadrature. Indag. Math. (N.S.) **3** (1992), 391–402.

83. (With J.L.H. Meyers) Logarithmic convexity for supremum norms of harmonic functions. Bull. London Math. Soc. **26** (1994), 353–362

84. (With J.L.H. Meyers) Massive coalescence of nodes in optimal Chebyshev-type quadrature on $[-1, 1]$. Indag. Math. (N.S.) **4** (1993) 327–338.

85. (With J.L.H. Meyers) Chebyshev-type quadrature on multidimensional domains. J. Approx. Theory **79** (1994), 144–164.

86. (With J.L.H. Meyers) Spherical Faraday cage for the case of equal point charges and Chebyshev-type quadrature on the sphere. Integral Transforms and Special Functions **1** (1993), 105–117.

87. Chebyshev-type quadratures: use of complex analysis and potential theory. Lecture notes prepared with the assistance of A.B.J. Kuijlaars. In: Complex Potential Theory (P.M. Gauthier and G. Sabidussi, eds.), Kluwer, Dordrecht, 1994, pp 325–364.

88. Approximation of integrals by arithmetic means and related matters. In: Approximation and Computation (R.V.M. Zahar, ed.). Internat. Ser. Numer. Math. vol. 119, Birkhäuser, Basel, 1994, pp 343–352.

89a. Living in a Faraday cage. In: Complex analysis and related topics (J.J.O.O. Wiegerinck, ed.). Math. Dept, Univ. of Amsterdam, Report 1993–25, pp 103–109.

89b. (Book essay) The Schwarz function and its generalization to higher dimensions, by H.S. Shapiro. [Wiley-Interscience, New York, 1992.] Bull. Amer. Math. Soc. **31** (1994), 112–116.

90a. (With M.A. Monterie) Fields due to equilibrium distributions of equal point charges on smooth and on convex conductors in $\mathbb{R}^3$. Math. Dept, Univ. of Amsterdam, Report 1994–15.

90. A monotonicity property of ultraspherical Christoffel numbers. Ann. Numer. Math. **2** (1995), 277–287.

90a. (Lecture notes) Introduction to singular integrals. Math. Institute, Univ. of Amsterdam, 1995.

91. (With M.A. Monterie) Approximation of the equilibrium distribution by distributions of equal point charges with minimal energy. Trans. Amer. Math. Soc. **350** (1998), 2329–2348.

92. Electrostatic fields due to distributions of electrons. Ann. Fac. Sci. Toulouse Math., Numéro spécial Stieltjes, 1996, pp 57–76.

93. Fekete extreme points and related problems. In: Approximation theory and function series. Bolyai Soc. Math. Studies vol. 5, Budapest, 1996, pp 35–62.

94. (With L. Bos) Characterization of algebraic sets by Chebyshev quadrature. J. Analyse Math. **75** (1998), 233–246.

95. Chebyshev quadrature recognizes algebraic curves and surfaces. In: Approximation Theory IX, vol. 1 (C.K. Chui and L.L. Schumaker, eds.) , Vanderbilt University Press, Nashville, TN, 1999, pp 165–174.

96. On a question of Brézis and Nirenberg concerning the degree of circle maps. Selecta Math., New ser. **5** (1999), 107–122.

97a. Nonlinear Tauberian theorem of Erdős revisited. Math. Preprint Series, Fac. WINS, Univ. of Amsterdam, Report 1998–29.

97. Roots under convolution of sequences. Indag. Math. (N.S.) **10** (1999), 539–548.

98. Tauberian theorem of Erdős revisited. Combinatorica **21** (2001), 239–250.

99. (With M.A. Monterie) Fekete potentials and polynomials for continua. J. Approx. Theory **109** (2001), 110–125.

100. Growth of power series with square root gaps. J. Analyse Math. **85** (2001), 177–194.

101. Tauberian theory, approximation and lacunary series of powers. In: Trends in Approximation Theory 2000 (K. Kopotun, T. Lyche and M. Neamtu, eds.), Vanderbilt Univ. Press, Nashville, TN, 2001, pp 167–188.

102. Problems of Chebyshev quadrature on sphere and circle. Math. Preprint Series, Fac. of Science, Univ. of Amsterdam, Report 2000–19.

103. A century of complex Tauberian theory. Bull. Amer. Math. Soc. (N.S.) **39** (2002), 475–531.

104. A Tauberian theorem for Laplace transforms with pseudofunction boundary behavior. Contemporary Mathematics vol. 382 (2005), 233–242.

105. (BOOK) Tauberian Theory, a Century of Developments. Grundl. math. Wiss. vol. 329, Springer, Berlin, 2004, xv+483 pp. Reprinted in China 2006.

106. Distributional Wiener–Ikehara theorem and twin primes. Indag. Math. (N.S.) **16** (2005), 37–49.

107. A simple proof of the prime-number theorem (Dutch). Nieuw Arch. Wisk. (5) **5** (2004), 284–291.

108. The Wiener–Ikehara theorem by complex analysis. Proc. Amer. Math. Soc. **134** (2006), 1107–1116.

109. Prime pairs and zeta's zeros. Manuscript, May 15, 2007. Available from arXiv:0806.0934v1 [math.NT].

110. Prime pairs and the zeta function. J. Approx. Theory **158** (2009), 69–96.

111. (With Fokko van de Bult) Mean value one of prime-pair constants. Manuscript, June 2008. Available from arXiv:0806.1667v1 [math.NT].

112. Lower bound for the remainder in the prime-pair conjecture. Manuscript, June 2008. Available from arXiv:0806.40577v1 [math.NT].

113. Ikehara-type theorem involving boundedness. Manuscript, July 3, 2008. Available from arXiv:0807.0537v1 [math.NT].

114. (With Herman te Riele) Average prime-pair counting formula. Math. Comp. **79** (2010), 1209–1229.

115. How do the primes jump? (Dutch) Nieuw Arch. Wiskd. (5) **11** (2010), 244–249.

116. (BOOK) Fourier analysis and related topics. Amsterdam, Spring 2011. (See the Internet)

117. The prime-pair conjectures of Hardy and Littlewood. Indag. Math. (N.S.) **23** (2012), 269–299.

118a. In memoriam Israel Gohberg (1928–2009). Indag. Math. (N.S.) **23** (2012), 610–614.

118b. Chebyshev quadrature. Overview, and commentary on Gautschi's work. In: Walter Gautschi, Selected Works with Commentaries, vol. 2. Birkháuser/Springer, New York etc., 2013, pp 23–26.

119. (With Rob Tijdeman) The history of Indagationes Mathematicae (Dutch). Nieuw Arch. Wiskd. (5) **14** (2013), 66–72.

120. Early work of N.G. (Dick) de Bruijn in analysis and some of my own. Indag. Math. (N.S.) **24** (2013), 668–678.

121a. Column Priemparen. Nieuw Arch. Wiskd. (5) **14** (2013), 251–252.